Scope Analysis of SAP's EH&S Module in Indian Chemical Industry (Experience Report) (ES)

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Abstract

Companies regulated by the EPA (Environmental Protection Agency) , OSHA (Occupational Safety and Health Administration) and other federal, state and local agencies have to deal with EH&S (Environment Health & Safety) process as part of their business operations. EH&S IT solution is a key tool in dealing with EH&S reporting requirements. With changing regulatory requirements, organizations need solutions which can support traditional EH&S requirements and emerging needs such as global warming, greenhouse gas reporting and carbon trading. Enterprises today are putting themselves at risk by not managing their EH&S portfolio and their EH&S data. They need to integrate their EH&S compliance and risk management activities in a single platform.

Keywords: ERP, EH&S, Environment, KPI's.

INTRODUCTION

Companies regulated by the EPA, OSHA and other federal, state and local agencies have to deal with EH&S process as part of their business operations. EH&S IT solution is a key tool in dealing with EH&S reporting requirements. With changing regulatory requirements, organizations need solution which can support traditional EH&S requirements and emerging needs such as global warming, greenhouse gas reporting and carbon trading. Enterprises today are putting themselves at risk by not managing their EH&S portfolio and their EH&S data. They need to integrate their EH&S compliance and risk management activities in a single platform.

Since many companies in India are exporting their products to United States of America, United Kingdom and to Europe, they have to comply with the norms decided by the regulatory bodies of the respective market places. There is an enormous potential of EH&S IT market in India. The most known ERP (Enterprise Resource Planning) – SAP (Systems, Applications and Products) – has a module for EH&S that is not widely implemented in India but it has a vast market scope as industries have started implementing management systems for EH&S. Since SAP is the widely accepted brand in India with approximately 55% market share (SAP, 2008) and L&T Infotech is a partner of SAP so L&T Infotech is planning to venture in the field of SAP EH&S market for Indian Chemical Industry.

The objectives of this report are check the Scope of SAP EH&S market in Indian Chemical Industry, study the process of SAP EH&S and find out the KPIs (Key Performance Indicator) for the same, study the best practices for EH&S IT in India and trying to integrate and apply

them on SAP EH&S and provide the Process, Business and IT consulting related to SAP EH&S.

The expected key benefits derived out of the project are:

1. Knowledge of KPIs for each process of SAP EH&S, which is beneficial in reducing the life cycle time of Implementation of SAP EH&S and molding it according to Indian as well as global needs.
2. Knowledge of approximate potential market size of SAP EH&S which is beneficial for L&T Infotech in making the decision of venturing into this field of SAP EH&S.
3. Knowledge of Global and Indian norms and regulations which are applicable to Indian chemical industry which is beneficial for the implementation of EH&S IT system for the same.

NEED AND SIGNIFICANCE OF THE REPORT WORK

Compliance is not an optional activity. The regulated community is well aware of the consequences of NOT complying with rules, regulations, policies and procedures – Including fines, negative impact on company image and product branding, and even criminal penalties. Unfortunately achieving or assuring compliances can be a tremendous challenge. A single facility can be responsible for meeting thousands to hundreds of thousands discrete requirement each year. In addition compliances management touches almost all aspects of the enterprise.

Manual compliance management processes can place a huge time and money burden for major corporations and government agencies with cost reaching six and seven figures for each facility. Business and regulatory pressures, as well as sheer volume of data, are compelling reasons for large organizations to seek an Environment, Health and safety (EH&S) Management information system (EMIS) for compliance.

As we said above, SAP is the market leader in ERP market of India near 55% market share (SAP, 2008). This ERP has a module for Environment, Health and Safety – SAP EH&S – that has not been implemented widely in Indian Chemical Industries. Now companies have started implementing EH&S management system and since L&T is a partner of SAP, it is planning to enter in the market of SAP EH&S for Chemical Industry.

The present report is an attempt to provide consulting to L&T Infotech in the field of SAP EH&S and to provide them the information related to the potential SAP EH&S market for Indian Chemical Industry. It also provides the insights of the SAP EH&S processes and attempt to find the KPIs for each process in order to reduce the implementation time of SAP EH&S. The consulting would include all the tree aspects below:

- **Process Consulting**
- **Business Consulting**
- **IT consulting**

PROBLEM DEFINITION

Objectives/ Deliverables

The Objectives and Major Deliverables of the project can be summed up under the following heads:

1. To check the Scope of SAP EH&S market in Indian Chemical Industry.

a. Study of Indian chemical Industry
b. Try to find out the potential SAP EH&S market in Indian Chemical Industry.
c. Study the Indian and Global norms and regulations for EH&S which Chemical industry has to comply with.

2. To study the process of SAP EH&S and find out the KPIs for the same.
3. To study the best practices for EH&S IT in India and trying to integrate and apply them on SAP EH&S.
4. To provide the Process, Business and IT consulting related to SAP EH&S.

Methodology

The Methodology employed is based on four mainly steps, namely:

S1 - Studying the Indian Chemical industry.

S2 - Understanding the processes in SAP EH&S and find out the KPIs for the same.

S3- Studying the Best Practices of EH&S in Indian Chemical Industry by available literature and interviewing EH&S heads of various companies.

S4 - Studying the global and Indian norms and regulations which are applicable to Indian chemical industries.

LITERATURE REVIEWED – SUB-MODULES IN SAP EH&S MODULE

SAP is the only major ERP vendor to have expended significant effort on developing EH&S functionality by providing a combination of mySAP ERP modules, listed below. All of these rely on the specifications database, which is delivered with the help of its development partner, Technidata. SAP's first customer was the chemical industry where the EH&s compliance has been a longstanding core competency (AMR, 2007).

In Indian Chemical Industries only the mainly top 5 Sub-Modules are implemented.

Each processes in SAP EH&S module includes Key functions, Process maps and Process flow diagram. We are going to present a summary of the Key Functions of processes of each module. The Process Maps and Process Flow Diagrams will be explored in detail in a further research.

A. OCCUPATIONAL HEALTH AND SAFETY **(**OHS)

The Key functions are distributed in eight mainly areas, since structuring of medical data and Health process workflows, till First aid training, Health data security and Integrated Master data.

B. INDUSTRIAL HYGIENE AND SAFETY (HIS)

It discovers a control or even eliminates the influence of the substance that can damage the health of employees and customers if handled improperly. The Key functions are distributed in nine mainly areas, since, define and edit work areas, till create work area related SOP (Standard Operating Procedures) and Display existing SOP's

C. PRODUCT SAFETY (PS)

The Key functions are distributed in five mainly areas since Check and maintain substance data till Trigger shipping of an MSDS – Material Safety Data Sheet.

D. WASTE MANAGEMENT (WM)

The Key functions are distributed in seven mainly areas, namely, Waste tracking and compliance, Lean Waste Management; Validation with dangerous goods; Integrated business scenarios; Material flow and waste quantity tracking (Area Allocation); Logistic chain management and Integration with SAP procurement.

E. DANGEROUS GOODS MANAGEMENT (DGM)

It ensures a secure data exchange and safe dangerous goods transportation including compliances with legal requirements.

The Key functions in DGM are distributed in four mainly areas, namely, Create Dangerous Master Records; Dangerous Goods check in SAP S&D; Printing Delivery notes for Dangerous goods and Distribution of tremcards.

CONSULTING TO L&T INFOTECH

Process Consulting

The process of consulting encompasses a) Finding KPIs for each Process and b) Finding the Inputs, Processing and Outputs for each process:

A. OCCUPATIONAL HEALTH AND SAFETY

A1. KEY PERFORMANCE INDICATORS (KPI'S)

- **Occupational Injury and illness (OII) rate:** This represents the number of employees who were injured or sickened as a result of working (Rohm& Haas, 2007).
- **Lost Time Injury (LTI) rate**: Injuries are tracked through LTI. This is a subset of OII rate, representing injuries that require time away from work for recuperation. LTI is monitored separately as these injuries have the potential to be more serious (Rohm& Haas, 2007).
- **Excellence in safety**: It is compatible with excellence with other business parameters such as productivity, profitability and quality. Safe healthy employees have positive impacts on all operations and customers, and enhance credibility in community.
- **Exposure Assessment rate**: It requires qualitative job exposure profiles and personal exposure monitoring for various chemical, physical and biological agents at all manufacturing sites. The job exposure profiles provide the estimate of intensity, frequency and duration of exposure to hazardous agents for each job, department and task combination at the site.

Based on AIHA (American Industrial Hygiene Association) strategy, this solution allows the hygienist to define Similar Exposure group – SEG (AIHA, 2006).

A2. INPUTS, PROCESSING AND OUTPUTS (ESSENTIAL SOFTWARE SERVICE, 2009)

INPUTS

- Injuries and Illnesses
- Near Misses
- Spill Events
- Other Incident Types

PROCESS

- Determine recordable status
- Track lost and restricted work days
- Detailed views of incident details including causes and conditions

OUTPUT

- Root cause analysis for improved incident prevention
- Timely information for compliance or corporate responsibility reporting
- Summary reports detailing existing and user-defined calculations for either worker safety or environmental risks

B. INDUSTRIAL HYGIENE AND SAFETY

B1. KEY PERFORMANCE INDICATORS (KPI'S)

- Number of Accidents
- Near Miss
- Spill Events

- Emergency preparedness and response
- Site security
- Tools and Equipment
- Training quiz(Forklift training, Hazardous substance training)
- Personal Protective Equipment(PPE)
- Reduction in Compensation Costs
- Reduction in labor hours spent in entering the data in different spreadsheets whenever any Accident/Incident occurs.

B2. INPUTS, PROCESSING AND OUTPUTS.

INPUTS

- Identify locations of key operations, activities or work areas with the potential for exposure, as well as the different job tasks performed in those areas.
- Track engineering controls by location, installation date, status and effectiveness, and document which controls are in place during any monitoring event.
- Maintain an inventory of the personal protective equipment (PPE) and document the PPE worn by an employee during exposure monitoring sessions.
- Track employee job history to document the various positions held by an employee over his or her work lifetime their exposure to potential hazards.

PROCESS

Streamlined approach to storing information about chemical and non-chemical agents, sampling device calibration data, and exposure results. The module facilitates the following processes:

- Work characterizations
- Defining similar exposure groups and exposure profiles (time-weighted average calculations and mixed exposure calculations)
- Exposure assessments

OUTPUT

- Sampling and monitoring results (by SEG, employee or task).
- User-defined priority rating calculations.
- Exposure assessment reports provide exposure profile details.
- Statistical analysis reporting (descriptive statistics, fit tests and plots, normal and lognormal parametric statistics.)
- Exposure notification reports

C. PRODUCT SAFETY

C1. KEY PERFORMANCE INDICATORS (KPI'S)

- MSDS distribution (When did we last send an MSDS to the customer? What is the current version of each product's MSDS?)
- Standard Operating Procedures (How efficient are they? Do we need some more customized SOPs for the particular need?)

C2. INPUTS, PROCESSING AND OUTPUTS.

INPUTS - Securely gather, store, and organize the data and documents necessary for MSDS management including materials information:

- Composition
- Properties
- Regulatory information

PROCESS - Secure archive of MSDSs to meet OSHA's record retention requirements that tracks the history and status of each MSDS, including:

- Status

– Vendor
– Revision date
– Reasons for changes

OUTPUT - enable users to find **MSDS´s** by:
– Material name
– Synonym
– Components,
– CAS(Chemical Abstract Service Registry) number,
– MSDS Status,
– Language
– Vendor
– Inventory storage location

D. WASTE MANAGEMENT

D1. KEY PERFORMANCE INDICATORS (KPI'S)

Resource Consumption measured in SAP
– Electricity (kWh)
– Water (cubic meters)
– Fuel oil (liters)
– Various raw materials (size/weight)
– Waste / scrap (size/weight)

D2. INPUTS, PROCESSING AND OUTPUTS.

INPUT - Gather, store, and organize the data necessary in waste program management, including:
– Waste manifest information from vendors and onsite shipment
– Applicable federal, provincial, and state waste codes (Applicable for Indian Companies as well who export their products to US)
– Analytic results for waste profiles, including attachments
– Data is collected using web-based data entry forms
– Data related to resource consumption

PROCESS
– Waste container movements, reconciliation of inventory, consolidations, and shipments
– Label generation, both regulatory and bar-code labeling
– Process for creating waste profiles
– Shipping using approved waste profiles to approved disposal facilities
– Inspecting waste storage areas
– Measuring the data related to resource consumption

OUTPUT - Produces outputs in formats such as:
– Streamlined manifest generation using collected regulatory information
– Internal waste management reports and KPIs
– Electronic regulatory reporting for certain jurisdictions
– Regulatory reports
– Reports related to resource consumption

E. DANGEROUS GOODS MANAGEMENT

General Information:
No. of KM per year invoiced by the company for chemical goods transportation:
– By own vehicles
– by integrated sub-contractors

No. of trucks deployed and no. of drivers:
- No. of Own trucks and trucks from integrated subcontractor
- No. of own drivers

Estimated percentage split of shipments by mode of transport:
- Road
- Intermodal rail/road
- Intermodal road/barge
- Intermodal road/sea

E1. KEY PERFORMANCE INDICATORS (KPI'S)

No. of incidents during transport and loading/unloading per year per million Km
- By own vehicles
- By integrated subcontractors

Total no. of training days of driver per year

Percentage splits of trucks between the EURO 1 to 5 categories: -
- By own trucks
- By integrated sub-contractor

Fuel consumption per tonneKm (Road Transport)

Co2 emission per tonneKm (Road Transport)

E2. INPUTS, PROCESSING AND OUTPUTS.

INPUT - Securely gather, store, and organize the data necessary for hazardous material management.
- Materials composition and properties
- Inventory transactions and inventory estimates
- Storage area information
- Container storage properties and storage area locations

PROCESS -Uses consistent methodologies to calculate required results, including:
- Maximum and average amount of chemicals stored on site for both pures and mixtures
- Chemical usage

OUTPUT- Produce regulatory report outputs in formats such as:
- IUCLID (International Uniform ChemicaL Information Database) for REACH (Registration, Evaluation, Authorization and Restrictions for Chemicals (EU Directive) compliance
- SARA ((Superfund Amendments and Reauthorization Act) 311
- SARA 312 Tier II (electronic submittal using EPA's Tier2 Submit software)
- SARA 313, TRI(Toxic Release Inventory) threshold determination
- Applicable for Indian companies as well who export their products to USA

F. BUSINESS COMPLIANCES SERVICES

As we said in section 4, only the first five sub modules are implemented in SAP EH&S module, so this last one will not be characterized.

Business Consulting – Indian Chemical Industry

Industry Overview

Chemical Industry is one of the oldest industries in India, which contributes significantly towards industrial and economic growth of the nation. It is highly science based and provides valuable chemicals for various end products such as textiles, paper, paints and varnishes, leather etc., which are required in almost all walks of life. The Indian Chemical Industry forms the backbone of the industrial and agricultural development of India and provides building blocks for downstream industries.

Total Market Size

Chemical Industry is an important constituent of the Indian economy. Its size is estimated at around US$ 35 billion approximately, which is equivalent to about 3% of India's GDP (Gross Domestic Product). The total investment in Indian Chemical Sector is approx. US$ 60 billion and total employment generated is about 1 million. The Indian Chemical Sector accounts for 13-14% of total exports and 8-9% of total imports of the country. Its contribution to the national revenue is about 18-20% of the total collection by ways of various taxes .In terms of volume, it is 12th largest in the world and 3rd largest in Asia.

Currently, per capita consumption of products of chemical industry in India is about 1/10th of the world average. Over the last decade, the Indian Chemical industry has evolved from being a basic chemical producer to becoming an innovative industry. With investments in R&D, the industry is registering significant growth in the knowledge sector comprising of specialty chemicals, fine Chemicals and pharmaceuticals.

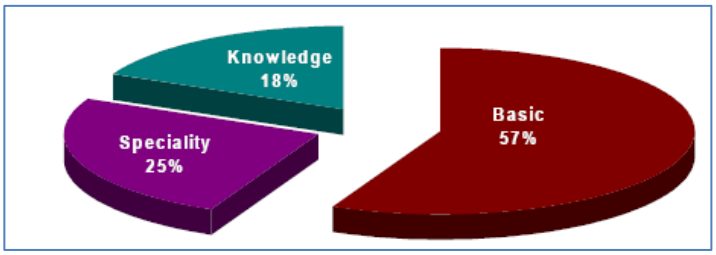
Market Segments

Indian Chemical industry can be segmented into tree principal parts, specifically:

- Basic Chemicals (Organic chemicals, Inorganic chemicals)
- Specialty Chemicals (Plastic sealants, Paints, Adhesives, Dyes, Additives)
- High End/Knowledge Segment (Agro Chemical, Pharmaceutical Industry, Bio-tech Industry)

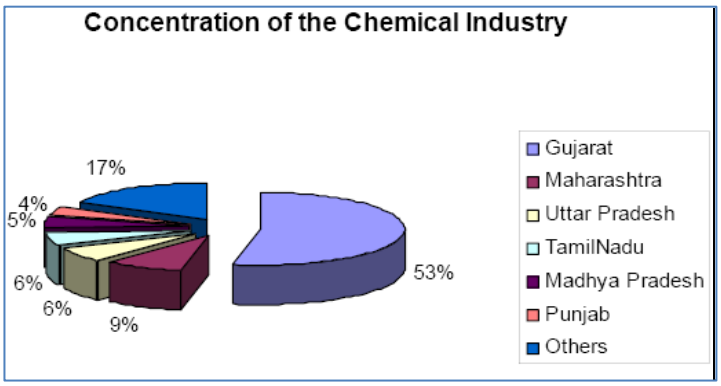
Segment	Market Value (billion US $)
Basic Chemicals	20
Specialty Chemicals	9
High End / Knowledge Segment	6
Total	**35**

Picture 3. Market segments. (Katiyar, 2005).



State wise share in production of major chemicals (2005-06) is could be seen in the graphic below:

Picture 4: Concentration of the chemical Industry on the different states of India (RJ/MRS, 2009)



Size of the potential SAP EH&S market

As we know that most of the Indian companies do not use the complete EH&S module, as it includes all the standard global norms, and they follow only local regulatory compliances but the Indian Companies who export to USA/Europe have to follow the global compliances and have to implement the full version of EH&S. So the methodology we have adopted for measuring the size of the potential SAP EH&S market is considering the revenue generated by exports only and in this export revenue we would see the EH&S spending of the company.

We can categorize the potential SAP EH&S market for Indian Chemical Industry in two ways:

1. Total IT Spending → Methodology 1
   SAP Penetrated Market (Firms that are having SAP but may not be having EH&S module) –Methodology 1.1
2. Total EH&S market (Including SAP and Non-SAP using companies)

Methodology 1 – Total IT Spending
We know that Indian chemical industry constitutes approx.13% of the total export (RJ/MRS, 2009) and in this 13% some 3.4% is the IT spending. We are considering some fraction of this 3.4% of this13% as market into consideration.

The total export is $119.3 billion, and then 13% of it would be $15.5 billion, so the total IT spending of our potential SAP EH&S market will be 3.4% of $15.5 billion and that would be around $527 million.

Methodology 1.1 –SAPs Client specific
Total IT spending (based on export) = 527 Million USD
Percentage share of ERP in IT budget for chemical Industry = Approx. 20% (Gartner, 2003)

SAP share in Indian market = 55% (SAP (2008).

So the spending on SAP in India Chemical Industry would be 527*0.20*0.55 = 57.97 million USD, the potential SAP EH&S market would be some fraction of 57.97 million USD.

Since no such official data is available regarding the EH&S share in SAP so we have to assume the potential market as some fraction of total spending on SAP by Indian chemical industry. Based on the empirical value by our industry visits we can say that EH&S spending is around 2% of the total SAP spending.

The following table lists a sample of industries in which ERP represents a high percentage of the IT budget:

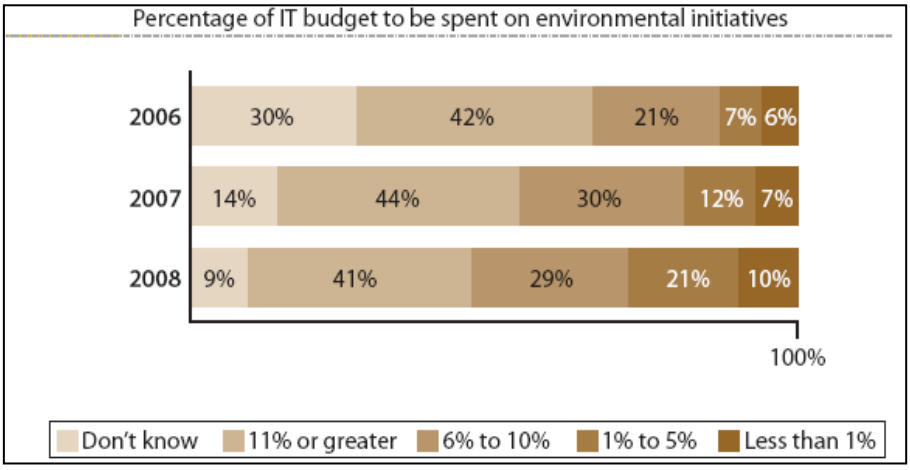
Table1. Percentage of ERP in IT budget (Gartner, 2003).

INDUSTRIES	IT /ERP
Wholesale distribution	42 %
Discrete manufacturing	25 %
Process manufacturing	28 %
Petroleum	28 %
Banking	20 %
Healthcare	22 %
Construction	30 %

Assumption – since we have taken the companies who are running their business on large scale and exporting their chemical products worldwide so we have assumed that they have been using some sort of ERP system for their operations.

Methodology 2 –Total EH&S market
Total IT spending (based on export) = 527 Million USD
Percentage of IT budget to be spent on Environmental Initiatives = approx 6-11%
That makes the total spending on Environmental initiatives is around 31.62 – 57.97 million USD

Picture 5. Percentage of IT budget to be spent on Environmental Initiatives (AMR, 2007)



EH&S Norms for Chemical Industry
Indian Norms – Environmental Norms

Table 1. Consolidated Environmental Regulations in India

YEAR	ENVIRONMENTAL REGULATIONS
1974	Water (Prevention & Control of Pollution Act) Amendments, 1988
1975	The Water (Prevention & Control of Pollution) Rules
1977	The Water (Prevention & Control of Pollution) Cess Act
1978	The Water (Prevention & Control of Pollution) Cess Rules
1981	The Air (Prevention & Control of Pollution) Act, Amendments, 1987
1982/1983	The Air (Prevention & Control of Pollution) Rules
1986	The Environment (Protection) Act, Amendments (1989,1990,1993,1996,1997,1998,1999,2000,2001)
1986	The Environmental (Protection) Rules
1992	E (P) Act Notification – "Environment Statement"
1994	E (P) Act Notification – "Environmental Clearance"
1997	Amendments in the Environment Clearance, Notification – "Public Hearing" made mandatory
1989	The Hazardous Wastes (Management and Handling) Rules, Amendments, 2000, Draft Amendments 2002
1989	Manufacture, Storage and Import of Hazardous Chemical Rules, Amendments, 1994, 2000
1991	The Public Liability Insurance Act/Rules, 1992
1995	The National Environment Tribunal Act
1997	Prohibition on the Handling of Azo dyes
1997	The National Environment Appellate Authority Act
1998	The Bio-Medical Waste (M&H), Rules
1999	Notification for making 100% Utilization of Fly-ash made mandatory

2000	Municipal Solid Waste (M&H) Rules
2000	Ozone Depleting Substance (R&C) Rules
1999	Regulation on recycling of Waste Oil and Non-ferrous scrape
2000	Noise Pollution (Regulations and Control)
2001	Batteries (M&H) Rules

Global Norms

Multilateral Environment Agreements and Protocols:

- Stockholm convention on Persistent Organic Pollutants (POPs)March 2003
- Rotterdam convention on Prior Informed Consent (PIC)
- Proposed Strategic Approach to International Chemical Management (SAICM)

Some Important protocols:

- Based Convention
- Montreal protocol on Ozone depleting chemicals
- Rio declaration of environmental friendly chemicals
- Code of conduct on distribution and use of pesticides
- Chemical weapons conventions on chemicals

These protocols restrict the production and sale of chemicals which pose a threat to EH&S.

Other Global Directives:

REACH- Registration, Evaluation, Authorization and Restrictions for Chemicals (EU Directive)

In 2001 European Commission initiated an extensive reform of European chemical policy under the acronym REACH-Registration, Evaluation, Authorization and Restriction of Chemicals- which came into force June 1, 2007. The regulation shifts the burden for proving the safety of substance, products and consumer use of those substances and products to the businesses that manufacture and import them. What's more, Business must work within REACH process framework to establish that proof by submitting REACH-complaint product information about its substances and products and their intended commercial use. If the substance information doesn't satisfy REACH legislation, the business will be denied authorization, registration and ultimately the right to import and manufacture that substance within EU.

OSHA 18001- Occupational Safety and Health Administration (Federal Directive)

OHSAS 18000 is an international occupational health and safety management system specification. It comprises two parts, 18001 and 18002 and embraces a number of other publications.

OHSAS 18001 is an Occupation Health and Safety Assessment Series for health and safety management systems. It is intended to help an organization to control occupational health and safety risks. It was developed in response to widespread demand for a recognized standard against which to be certified and assessed.

Responsible care

Responsible Care helps the industry to operate safely, profitably and with care for future generations. Through the sharing of information and a rigorous system of checklists, performance indicators and verification procedures, Responsible Care enables the industry to demonstrate how its health, safety and environmental performance has improved over the years, and to develop policies for further improvement.

Nevertheless, there is a common set of Fundamental Features (1996) that all associations must adhere to, ensuring the initiative remains true to its core ethic.

Responsible Care is the world's leading voluntary industry initiative - it is run in 53 countries whose combined chemical industries account for nearly 90% of global chemicals production.

IT Consulting

Pain areas of the Industry in the field of EH&S Management System

SAFETY

There are many departments and all of them have individual records associated with Safety. Centrally record is maintained in EH&S dept. No uniform database, i.e. in their terms, duplication of data occurs.

Too much effort was demanded to all departments during audit & submission of reports to authority. Reporting of status at the month becomes an issue.

Presently all the data is recorded & maintained in a spreadsheet. High efforts were made in searching the right document.

Central database is required for maintaining and tracking all accidents occurred and the updating of the data associated with the same in terms of actions taken, technical solutions employed.

HEALTH

There are many employees in a company. Currently the physicians have a manual way of tracking and scheduling the appointments for regular health check-ups of their employees and have a tough time managing that.

Health related data like regular health checkup, any accident related medical treatment it is maintained in register. Communication with employee for scheduled medical examination, lot of follow up to completed the medical examination. They want a system that gives alerts to dept/employee in term of a mail for their medical checkup. They would prefer a system to facilitate and schedule the regular health check-ups.

AUDIT MANAGEMENT

In view of their accreditation to various Quality, Environment, Health & Safety management systems, there is huge amount of documentation associated with measuring, monitoring of processes associated with audit of the above organizational compliance. It requires great effort for the compliance team to interact, coordinate with multiple departments, review, update and track.

The following are the requirement:

a. For their internal & external audits (ISO 9001, EMS, OSHAS 18001), a system is required for planning and communicating the audit schedule to their dept.
b. Recording the NCR through audit, corrective & preventive actions & their implementation.

DOCUMENT MANAGEMENT

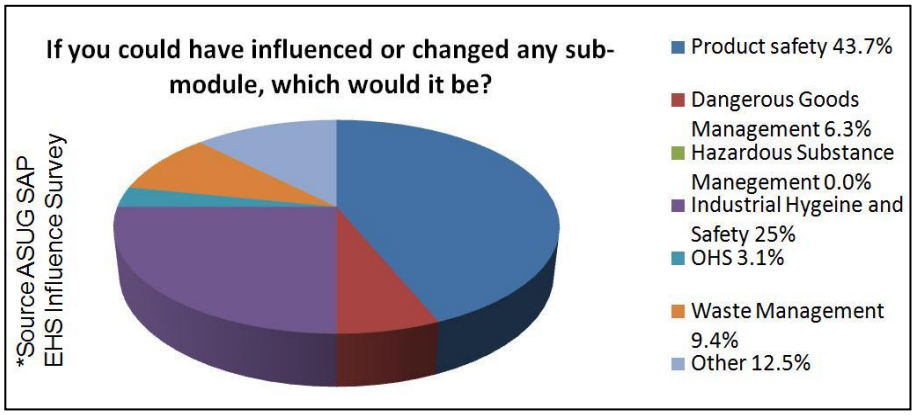
There is huge amount of documentation associated with measuring, monitoring of processes associated with audit of the above organizational compliance and that needs version management and other DMS features.

Comparison of features of SAP and other EH&S vendor companies could be consulted at the document named "Technology Options To Support EH&S Compliance" (AMR, 2007).

Industry Response to SAP EH&S and Recommendation to L&T

Since SAP is the market leader in ERP systems and it has a module for EH&S as well so the industry is quite hopeful about implementing the EH&S module but still there are some limitations with the EH&S sub-module which L&T Infotech needs to look upon and find ways to make it more useful.
Based on the survey (ASUG, 2008) about the usability of the sub-modules of EH&S it has been observed that Industry want some changes in Product Safety sub module (43.8%) and HIS sub-module (25%).

Picture 9. Industry wants some changes in Product Safety sub module (ASUG, 2008)



Since it's visible, from the survey, that industry still need changes in product safety and IH&S sub-module, the L&T Infotech realized the needs to work on the industry specific customization of these two sub-modules.

Cost estimation of implementing EH&S Management System – based on sample given by AMR research report (AMR, 2007)
A global manufacturer that was deploying technology for EH&S support at each of its 120 sites. As part of its blueprint, each individual site required its own site-level data model to support specific local compliance certifications and permits, not to mention the several custom integrations required because of the diverse data collection methods of each site. The consulting firm hired for this project was tasked to calibrate and install the software at each site, as well as perform any future modifications or changes to the system.

The cost breakdown for this project was as follows:

- $300K for the license fee paid to the vendor
- $750K for initialization paid to the consultant (e.g., creation of the models and integrations within the application)
- $250K for hosting and system support paid to the vendor
- Ongoing yearly support, including updates and modifications, at what the client estimates to be $300K a year split between the consultant and the vendor

While the vendor has created an annuity in hosting and support fees, consultants stand to see more revenue by owning the rollout.

FUTURE SCOPE
Organizations are finally allocating portions of their IT budget to support EH&S compliance efforts. According to AMR Research's 2007, IT spending projections, environmental health and safety (EH&S) compliance-related initiatives are third most important area impacting IT

in the near future, behind the application of lean practices across the organization/analysis of data throughout the organization (AMR, 2007)
Once started paying attention to the EH&S Management system due of its several benefits, and once SAP is the Market leader in Indian ERP market and has an EH&S module so possibility is quite high that companies will implement this module as they have already SAP in place.
The mostly significant drivers for adoption of SAP EH&S could be divided in bottom-line and Top-Line, with the respective expected results on their application, as showed below.

Bottom-Line Drivers

- Lower Risk of Legal Liability
- Lower Insurance Premiums
- Enhanced Resource & Energy Efficiency
- New Market Opportunities, First Mover Advantage
- Anticipation of Trends, ISO 14001

Bottom-Line Drivers (Expected results)

- The Cost Iceberg (Reduction in Cost)
- Insurance Premiums Down!
- "Hidden" Costs!
- Risk Reduction!
- Business Opportunities

Top-Line Driver

- Image, Corporate Citizenship

Top-Line Driver (Expected results)

- Positioned as a Corporate Citizen in community and customers
- Increased brand value

All these benefits seems to foresee a bright future for SAP EH&S adoption by organizations.

LIMITATIONS AND FUTURE RESEARCH

This pilot study focuses mainly on checking the scope of SAP EH&S market in Indian Chemical Industry. Since there is not any official data available for the potential market size of SAP EH&S so some methodologies have been applied based on certain assumptions. Finding the exact market size is nearly impossible so this is a limitation in the project.
As we can see, the total IT spending of chemical industry has been taken as 527 million USD based on export alone as per the assumption that companies who are exporting their products to US, UK and EU countries would be the one who would be looking forward to implement SAP EH&S majorly.
And it has been mentioned that 6-11% of the IT budget is spent on environmental initiatives but it's true for 70% of the industries.

The data sources we have taken from like AMR Research, Gartner-Executive Report are American journals and they have provided data in American Context that's why we were not able to clearly mention the cost of the implementation of EH&S module in SAP in Indian Chemical Industry but based on the empirical data that we got from our Industry visits we can say current the EH&S spending in SAP is almost 2% only.
Since SAP is the market leader in ERP systems and it has a module for EH&S as well so the industry is quite hopeful about implementing the EH&S module but still there are some

limitations with the EH&S sub-module which L&T Infotech needs to look upon and find ways to make it more useful.
Based on the survey (ASUG, 2008) about the usability of the sub-modules of EH&S it has been observed that Industry want some changes in Product Safety sub module (43.8%) and HIS sub-module (25%).
Since it's visible, from the survey, that industry still need changes in product safety and EH&S sub-module, the L&T Infotech realized the needs to work on the industry specific customization of these two sub-modules.

Future research should be done and based on data in an Indian Context, using a large sample of industries, so we were able to reveal the real cost of EH&S module in SAP in Indian Chemical Industry, based on real data generating statistically rigorous results.

CONCLUSIONS

Once the present report was an attempt to provide consulting to L&T Infotech in the field of SAP EH&S and to provide them the information related to the potential SAP EH&S market for Indian Chemical Industry, providing the insights of the SAP EH&S processes and attempting to find the KPIs for each process in order to reduce the implementation time of SAP EH&S. We can say that the expected key benefits, derived out of the report were generally achieved:

The knowledge of KPIs for each process of SAP EH&S, the knowledge of approximate potential market size of SAP EH&S which is beneficial for L&T Infotech and the knowledge of Global and Indian norms and regulations which are applicable to Indian chemical industry which is beneficial for the implementation of EH&S IT system.

The project has been successful in identifying a huge potential market for SAP EH&S in Indian Chemical Industry for L&T Infotech. Also since the KPIs for processes of SAP EH&S are the key elements so the knowledge of these KPIs automatically leads to the reduced life cycle time of implementing SAP EH&S. We realized that in Indian Chemical Industries only the mainly top five Sub-Modules are implemented. Each processes in SAP EH&S module includes Key functions, Process maps and Process flow diagram. The Process Maps and Process Flow Diagrams will be explored in detail in a further research.

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