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MATERIALS MANAGEMENT REVIEW



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PROCUREMENT & SUPPLY CHAIN MANAGEMENT





Materials Management Courses



AICTE

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January 2020 SESSION

भारतीय सामग्री प्रबंधन संस्थान

Indian Institute of Materials Management

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From the Desk of The National President



Dear Fellow Professionals!

Greetings from your National President.

At the outset, I would like to congratulate and welcome the newly elected National Executive Committee for the next term of 2 years to take IIMM forward from here. As many Presidents before me have passed on the baton to incoming National President, I am glad to handover the baton to Mr. Malay Mazumdar, incoming National President and his team.

I would also like to take this opportunity to thank my NEC Colleagues, Former Presidents, Branch Chairmen, National Council Members, Course Coordinators and IIMM Members for supporting and guiding me invariably through soft and hard times.

Last 2 years have been very eventful and a pleasant journey on the path of progress for IIMM in particular and MM/SCM Fraternity in general. During the last 2 years, we have achieved many important Milestones which include, recognition of AICTE for PGDMM and PGDSCM&L Programs, signing of MOUs for Contract management Programs with Coal India Limited (CIL) and Steel Authority of India Limited (SAIL) and with Indian Airforce for Professional Diploma in Public Procurement (PDPP) Program.

Formation of CRIMM in association with Techno India University, has been very successful and is a self-sustaining venture right from the beginning, producing excellent research work. With this, we are now offering courses from orientation level to Ph.D level (Ph.D through Techno India University).

As suggested by Board of Studies members during BOS meeting for having an MOU with Govt. Open University to start MBA program with a provision of Lateral entry is also in process and it will come up in due course of time.

Formulation of Public Procurement Professional Association of India (PPPAI) at National Level, jointly with World Bank is another important project which is at advance stage and will bring new horizon of opportunities to IIMM.

Kolkata and Jamshedpur branch have organised NATCOM 2019 in most befitting manner and it was a grand Annual National Event. I congratulate Chairman NATCOM 2019 and his team for grand success of NATCOM and would like to thank them for providing excellent hospitality. Delegates and participants have enjoyed the deliberations made by eminent speakers, which was a feast of latest developments in Supply Chain and trendiest concepts. The Delegates had many important takeaways from the event to their workplace.

I am confident that IIMM under the Leadership of Mr. Malay Mazumdar, will scale new heights with fullest support of NEC and NC.

Last but not the least, I on behalf of my NEC Colleagues, extend my thanks to each and every one, who have contributed directly or indirectly for the betterment of the Institute.

Yours



G. K. SINGH

National President - IIMM

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From the Desk of Chief Editor



Dear Members,

Public Procurement is a system-wide activity performed by Central and state governments, their autonomous and statutory bodies and public sector undertakings, with a wide variety of sector/institution specific requirements. A well-functioning and efficient public procurement system addresses issues like inefficiency, corruption, transparency and is also crucial for meeting the country's fiscal commitments.

As per Article 299 of Indian Constitution, Public Procurement activities in India are performed on behalf of President of India or the Governor of the state and are governed largely by General Financial Rules, Delegation of Financial Powers Rules and CVC Guidelines. However, Public Procurement activities get further complicated to fulfil various societal and developmental objectives such as the policy of purchase preferences, price preference, Make in India, Reservation of products for exclusive purchase from Small Scale Industries. In absence of comprehensive Procurement Act, GFRs allow the Govt. Entities to frame its own Procurement Manuals based on the policies given in the GFR.

The Indian Procurement market is estimated to be 25% of its GDP and hence, is a cause for increased attention from the academia and policy makers. Over the past few years, a series of reforms in the Public Procurement system have been initiated to streamline the Public Procurement Process.

Initiatives like Central Public Procurement Portal (CPPP), GeM, Electronic Reverse Auction, Value for Money concept, Whole of Life Cycle Concept etc. are worth noticing which not only enhances transparency but ensure best value of public spending. However, much public procurement reforms are needed which consider the Environmental parameters, Social Parameters, Green Procurement practices, larger extent of participation by stakeholders beyond Procurement officials, CVC & Auditors – like Domestic/Private Sector and Citizens of the country.

Public Procurement reforms acts as an important tool for improving country's economic activities, investment sentiments and social environment besides strengthening public sector performance to realize the Public policies into tangible results for its people. Transparent and accountable Public Procurement systems have the power to catalyse the domestic sector development (MSMEs) by giving them ample opportunities to participate in bidding process. Start-ups have also been given the relaxation of Turnover and Experience criteria while participating in Public Procurement Process.

Public Procurement activities majorly suffers from Weak Capabilities and Competencies in the system. This weakness can largely be attributed to poor quality of training programs or non-availability of skilled workforce, who can deal with Public Procurement issues. This challenge can be overcome by creating an enabling environment to nurture and sustain the capacity building of officials dealing with Public Procurement activities.

Public Procurement Reforms can play a vital role in every sector of Society. Better public Procurement System can foster efficiency, equity, transparency, social accountability and competitiveness which will lead to enhanced Economic Activities and hence economic development.

A handwritten signature in black ink, consisting of stylized, overlapping loops and strokes.

(DR. M.K. BHARDWAJ)



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TRANSFORMATION OF SUPPLY CHAINS THROUGH DIGITIZATION

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Abstract : This paper analyses the various facets of digital supply chain transformations and its benefits as reported in the McKinsey's report on digital supply chains and also PwC reportson Industry 4.0 - how digitization makes the supply chain efficient, agile and customer-focused.

Digital transformation ways and its impact on supply chain and creating or defining market place were discussed. The McKinsey digital supply chain compass maps supply chain 4.0 improvement levers and main value drivers were highlighted. Future digital supply chain transformations and its benefits were also discussed.

Keywords: digital disruptions, electronic innovations, digital transformations, supply chain 4.0,

Introduction : The companies that are truly aiming in recent times have something significantly in common: a digitized supply chain. 89% of companies with digital supply chains receive perfect orders from international customers, and entering on time delivery / error free delivery.

Companies have saved labour time for its logistics team after digitizing its vendor booking process. Digitization brings about future supply chains (supply chain 4.0), which will be faster, more flexible, more granular, more accurate, more efficient and agile in nature (McKinsey, 2019).

Supply chain professionals expect digitization to bring significant economic benefits to both top and bottom lines. Companies with highly digitized supply chains and operations can expect efficiency gains of 4.2% annually, while increasing revenue by 2.9% a year. Companies across industries are already investing heavily to develop their own versions of the digital supply chains. According to a recent PwC study on the rise of Industry 4.0, a third of the more than 2000 respondents say their companies have started to digitize their supply chains and fully 72% expect to have done so five years from now. Lot of supply disruptions are going to take place in the coming years.

Redefining the supply chain : There are five main ways in which electronic innovation / digital transformations impacting the supply chain and creating or redefining market place.

Main ways	Details
Dematerialization	Reduction, removal, and redeployment of substantial assets invested in traditional sales and marketing.
Disintermediation	Compression in the length of the supply chain through the elimination of middle men in the sales process.
Deverticalization	Creation of extended enterprises, linked manufacturers and inter-linked groups operating within new electronic markets.
Data integration	Real time access, capture and transfer of data between trading partners.
Development of products	Which support, sustain and new extend electronic commerce

Source: Jon Hughes, Mark Ralf & Bill Michels, 2002.

Digital supply chains : Digital supply chain means that it is an integrated planning and execution, logistics visibility, procurement 4.0, smart warehousing, efficient spare parts management, autonomous and B2C logistics and prescriptive supply chain analytics.

The McKinsey Digital Supply Chain Compass maps Supply Chain 4.0 improvement levers to 6 main value drivers



SOURCE: McKinsey

Figure 1 The McKinsey digital supply chain compass supply chain 4.0 improvement levers to 6 main value drivers.

Digital transformation includes digital development and digital disruptions. Digital supply chains are working on 'pull based inventory' principle. Digital transformation improves speed, flexibility, operational efficiency and customer experience (Sengottuvelu, 2019).

Digitization brings about future supply chains (supply chain 4.0), which will be faster, more flexible, more granular, more accurate, more efficient and agile in nature (McKinsey, 2019).

According to McKinsey study, planning, physical flow, performance management, order management, collaboration and supply chain strategy are 6 main value drivers in the supply chains.

Today's supply chains are a series of discrete steps involved, product development, sourcing & procurement, manufacturing, marketing, distribution, logistics and customer care. Digitization will change that, bringing down walls and creating a completely integrated ecosystem that is fully transparent to all the entities involved. The ecosystem will depend on several key digital technologies including 3D printing, robots, analytics & other logistical platforms (Stefan Schruf, 2017).

Future digital supply chain transformations

According to Jag Srai (2017), the future digital supply chain transformations (DSCTs) are going to take place in the following areas:

Digital supply chain transformations	Salient features and benefits
i. Automated e-Sourcing	Digitization can give enhanced visibility through seamlessly connected, automated replenishment in line with real-time KPI monitoring and predictive disruptive analytics.
ii. Digital factory design	3D, FMS, & EDI will deliver a new paradigm for factory layout design, process and material flow. Organization will need to analyse if, it is cost effective and whether it will create and capture the most value.
iii. Real-time factory scheduling	Sensor-enabled smart devices, real-time data KPI monitoring & predictive maintenance could lead to increased productivity and improved delivery service.
iv. Flexible factory automation	While automation can deliver cost for variety, increased customization, labour saving, quality assurance, closer to market and improved health and safety it also needs to support necessary economics and enable flexible configuration.
v. Digital production process	Additive manufacturing, & continuous processing with advanced process analytics will enable new product designs and enhanced customization, it can also disrupt entire supply chains.
vi. E-Commerce fulfilment	Web-based order management and inventory management to multiple POS, covering last-mile delivery and direct delivery, constant monitoring of usage and experience and tailoring to suit to the requirements.
vii. Extended supply chain (near) real-time monitoring	This could help companies to optimize integration, predict disruptions and support dynamic decision-making.
viii. Digital product quality	Companies can create powerful digital product quality management systems by connecting back from customers to suppliers. This could result in problem prevention and faster resolution, better performance, compliance verification and avoided warranties.
ix. Digital supply chain design	Digital network design modelling and visualization tools can be used to redesign the total supply network configuration.
x. Product life cycle management (PLM)	Next-gen PLM systems will provide accurate, up to-date product information accessible throughout the value chain and product life cycle.

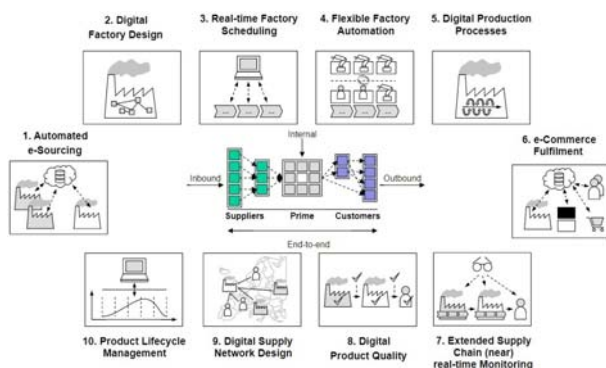


Figure 2 Future digital supply chain transformations

Figure 2 shows the future digital supply chain transformations and its salient features with benefits. For examples, when companies are having issues related to scheduling, then DSCT- 3, will take care of such issues. Similarly, quality related issues are addressed through DSCT-8, product life cycle management through DSCT-10, so on and so forth.

Conclusion : In recent years companies are more focusing on their supply chain digitization. This is going to continue for next 5-10 years. According to the reports of McKinsey and PwC, Industry 4.0 technologies are going to disrupt the supply chains further. IoT, AI, ML 3D, Sensor based –smart devices and automation are going to bring new challenges and opportunities to the corporates. Linear supply models operating in silos are going to adopt integrated supply chains. Supply chain strategies are going to focus on lean and agile philosophies in business. Supply chain professions in general are going to focus more value added links in their supply and eliminate non-value added activities / functions. In other words, how value is added in their supply chains to offer to their customers.

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Indian Institute of Materials Management

MISSION

- To promote professional excellence in Materials Management towards National Prosperity through sustainable development.

OBJECTIVE

- To secure a wider recognition of and promote the importance of efficient materials management in commercial and industrial undertakings.
- To safe guard and elevate the professional status of individuals engaged in materials management faculty.
- To constantly impart advanced professional knowledge and thus improve the skill of the person engaged in the materials management function.
- Propagate and promote among the members strict adherence to IIMM code and ethics.

CODE OF ETHICS

- To consider first the total interest of one's organisation in all transactions without impairing the dignity and responsibility of one's office :
- To buy without prejudice, seeking to obtain the maximum ultimate value for each rupee of expenditure.
- To subscribe and work for honesty and truth in buying and selling; to denounce all forms and manifestations of commercial bribery and to eschew anti-social practices.
- To accord a prompt and courteous reception so far as conditions will permit, to all who call up on legitimate business mission.
- To respect one's obligations and those of one's organisation consistent with good business practices.

SKILL DEVELOPMENT : CHALLENGES AND OPPORTUNITIES

DR. MANISH KUMAR
MD & CEO NATIONAL SKILL DEVELOPMENT CORPORATION

India is driving unique initiatives under the Skill India mission to create an employable workforce. About 7 crore additional individuals in the working age (15-59 years) are expected to enter the country's labour force by 2023. This will include 5.9 crore youth (persons aged 15-30 years)¹. Reinforcing efforts to develop the skills of the country's youth is therefore of essence. There is also a need to build on strategies for upskilling and reskilling the workforce and for formal recognition of informally acquired skills.

In India, there are a variety of skill development models - government-funded programs that fully or partially subsidise training/apprenticeship, market-led trainings (where trainees pay for the course), market-led apprenticeships, industry-led/on-the-job training. The National Skill Development Corporation (NSDC), a not-for-profit public limited company (with 51% share capital owned by industry associations and 49% by the government), was set up as a Public Private Partnership (PPP) model, to catalyse private sector participation in the Indian skill development sector. A core role of NSDC is providing long-term development finance to organizations for building for-profit vocational training initiatives. We also work closely with the Ministry of Skill Development and Entrepreneurship (MSDE) to implement government grants-based vocational training programs, where infrastructure is set up by private providers and training costs are subsidized by the government. Our focus is also on creating and strengthening enabling systems for the provision of skills training - covering elements such as standards, content and curricula.

This article highlights some of our challenges and strategies to respond to the skill development imperative. Our effort hinges critically on collaboration with industry and the private sector. Demonstrating the impact of skill development interventions is another challenge and is needed not only to increase the aspirational value of skills, but to encourage greater participation by industry. An understanding the supply-side of skills in India is also needed, especially given the prevalence of informality in the country's labour market.

Driving industry participation Through partnership models...

Collaboration with industry is fundamental for ensuring relevance and quality of skills training and for building the institutional structures required to achieve envisaged outcomes. 37 Sector Skill Councils (SSCs) are currently operational, with over 600 corporate

representatives in their Governing Councils, to foster industry connect and develop industry-relevant course and curriculum. We also encourage innovative industry partnership models to drive reskilling and upskilling initiatives and develop collaborations with employers to prepare their workforce for new technologies and the future of work. To understand the upskilling and reskilling imperative, consider the following figures: India's labour force above 30 years of age is 26.2 crore in size, of which 25.9 crore individuals are currently employed.² They may need to upgrade their skills and/or acquire new ones.

One challenge is that skills are often difficult to observe or measure and therefore proxies such as educational attainment are used. But these may not be adequate proxies. People in specialized occupations (for example plumber, automotive mechanic) may be highly skilled even if they do not have a formal educational qualification. At the other end, an aeronautical engineer has both high skill and high level of formal education. Years of education or level of formal education may be an especially imperfect proxy in an economy such as India's, where there is a vast segment of informal workers in India, many of whom possess skills that have not been formally recognized.

In such a scenario, employers may not know which skills a potential employee possesses, and therefore may not be willing to pay a premium for the skills. Formal certification can improve an individual's bargaining power, and there is some evidence for this. A third-party evaluation³ of the RPL component of the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) found that on average, RPL-certified individuals earn 25% more after certification and their monthly income is 19% higher than that of similar individuals who have not undergone the program.

An NSDC analysis of a unique dataset based on a household survey conducted by the Centre of Monitoring Indian Economy (CMIE) has shown us that there are over 39 crore individuals who have acquired skills informally - through self-learning, on-the-job learning, hereditary or other sources. Of these, a majority (38.4 crore) are working. This points to the scope for RPL interventions.

Both RPL interventions and apprenticeship-related ones typically involve collaboration with industry and the private sector, even when they are part of publicly-funded programs. For instance, the RPL program under PMKVY includes an industry-led model that involves partnership with large employers. The apprenticeship

intervention under the National Apprenticeship Promotion Scheme requires industry to take on apprentices who are trained while working in the enterprise.

... and in the operationalization of training delivery

'Skill' is a complex concept and a variety of definitions are used. The Macquarie Dictionary defines skill as 'the ability that comes from knowledge, practice, aptitude, etc., to do something well'. The ILO defines skill as the ability to carry out a given job⁴. It has two dimensions: skill level (which depends on the complexity 'and range of the tasks) and skill specialization (field of knowledge, tools/machinery/materials used, goods & services produced). Operationally, the ILO uses educational attainment to define skill level, which only partially reflect that skills can also be acquired through informal learning and experience.

According to ILO (2017)⁵, there are three types of skills: generic / soft skills (ICT, problem-solving, 'communication, decision-making skills); basic (literacy and numeracy); job-specific / technical (specialist knowledge, knowledge of products or services produced, ability of operating specialized technical tools and machinery, knowledge of materials worked on or with). The World Bank⁶ finds that three types of skills are increasingly important: advanced cognitive skills such as complex problem-solving; socio-behavioural skills such as teamwork; and skill combinations that are predictive of adaptability such as reasoning and self-efficacy. Espesto (2008)⁷ suggests that skills are those generalizable attributes of individuals that confer advantage in the labour market. The following definition of skills stated by the NSSO also specifies that skills have market value: 'Any marketable expertise, however acquired, irrespective of whether marketed or not, and whether the intention is to market it or not, is considered as skill. Thus, a person holding a certificate/ diploma on an appropriate subject will be considered to possess the specified skill along with persons who have acquired the said skill without any such certificate/ diploma or even without attending any institution.'

A central theme that emerges from these definitions is that skills are related to 'competence' and the ability to do a job well. may be formally or informally acquired, and have a market value. Vocational programs play a critical role in imparting such skills. The NSSO notes that the primary objective of vocational education and training is to 'prepare persons, especially the youth, for the world of work and make them employable for a broad range of occupations in various industries and economic sectors or enable access opportunities of self-employment'. Vocational education and training courses enable students to acquire skills which are traditionally non-academic and related to specific trade, occupation or vocation.

In India, the National Skills Qualifications Framework (NSQF) is the competency-based national framework to which many training programs, including the government-funded ones, are aligned. Across countries, such qualification frameworks emphasize objectives

such as relevance and flexibility of education and training programs, recognition of prior learning, enhancing lifelong learning, developing quality assurance systems. Accordingly, through the National Policy on Skill Development 2009, India had also recognized the need for a national qualification framework to stimulate and support reforms in skills development.

The NSQF describes each of its ten levels in terms of competency levels that would need to be achieved. Under this framework, 'skill' is interpreted as the ability to apply knowledge and use know-how to complete tasks and solve problems. A distinction is drawn between cognitive (involving the use of logical, intuitive, creative and critical thinking) and practical skills (involving manual dexterity and the use of methods, materials, tools and instruments). Each NSQF level specifies learning outcomes - which may be achieved through formal or informal learning - in terms of process, professional knowledge, professional skill (which includes cognitive skills; communication and interpersonal skills and generic skills), core skill and responsibility.

In the NSDC ecosystem, the NSQF framework is operationalized through the creation of National Occupation Standards (NOS) and Qualification Packs (QP). A NOS defines measurable performance outcomes required from an individual engaged in a given task and states what he or she should know and do. A QP corresponding to a job role is defined as a combination of the relevant NOSs. NOSs and QPs are formulated by SSCs, which drive industry participation in the process through expert committees, stakeholder workshops and validations from organizations. Over 2200 QPs and 6600 NOS' have been created so far.

The next step is curriculum development. The curriculum presents the plan for instruction and contains the objective of the content in terms of the skills and knowledge to be imparted. It defines the target audience, the content, teaching tools and equipment, and assessment. The curriculum simplifies and breaks down the NOSs into specific learning objectives.

The curricula and content include components of soft skills, employability skills and entrepreneurship. For instance, under PMKVY, the duration of the soft skills training module has been increased from 40 hours to 150 hours depending on the job role, with 20 hours dedicated for entrepreneurial training.

There is a recognition that effective and qualified trainers and assessors are critical for high training standards and robust assessment processes. Systems that provide continuous professional development training and certification to eligible trainers covering domain and platform skills have therefore been put in place and are being strengthened. While National Skill Training Institutes (NSTIs) under Directorate General of Training (DGT) prepare trainers and assessors for long term training programmes, SSCs/NSDC develop trainer and assessor capacity for short term training programmes through an industry-driven process.

Measuring and amplifying impact of skill development interventions

The systems and processes that have been developed and strengthened over the years have enabled scale in imparting skills training. With an annual training capacity of 5 million, NSDC has over 500 training partners that run 11,000-plus training centers across India. Training under government programs has been conducted in more than 8,000 training centers. The NSDC-supported ecosystem has skilled over 2 crore candidates through its partners, who run training programs that may or may not be part of government schemes.

Additionally, we have observed impact on the ground. In a third-party evaluation of PMKVY 2016-2020,⁸ it was seen that STT training and certification leads to an increase of nine percentage points in the proportion of employed respondents (32% vs 23% in comparison group) and training by itself leads to an increase of eight percentage points (31% vs 23%). 30% of PMKVY-STT respondents were not looking for jobs at the time of the survey due to interest in education or other reasons. Out of the individuals looking for employment, 45% were found to be employed. The evaluation also found that the average monthly income of STT trained and certified individuals was 15% higher than that of similar individuals. Training per se led to an increase of 9 percentage points in average monthly income.

In addition to the quantitative benefits mentioned above, RPL-certification was found to have various qualitative benefits. 61% of the respondents acknowledged that they have benefitted from the RPL program, wherein the most stated benefit was 'increase in self-confidence' (79%). Also, 75% of employed RPL-certified respondents said that PMKVY training has helped them to be more prepared for their current employment.

This evaluation study is in line with the literature that uses quasi experimental designs to identify an intervention's impact. Comparison groups are created by matching on observable attributes such as demographic factors. Examples of such studies include: a study of the skill training and employment placement services of projects under Employment Fund (EF) in Nepal, which found a positive and significant effect on employment rates and earnings; an evaluation of a training program targeted at poor youth in Argentina, which found evidence of formalization of employment; and a World Bank study of Skill Development Programs in five States in India (Assam, Andhra Pradesh, Madhya Pradesh, Odisha and Rajasthan), which found that the programs on average have contributed to increasing the employment and earnings of the trainees.

To understand whether participants perceive any benefits of undergoing formal vocational training courses (long- or short-term), we studied data from a household survey conducted by the Centre for Monitoring Indian Economy (CMIE). Among those who were working and have completed a formal training program, over 71% said that the training was helpful, of which 76% of them said the training helped them to

get work. Among those who were not working at the time of the survey but had worked post training, nearly three-quarters stated that the training was helpful, with the most cited benefit being that it helped them in getting work.

Efforts to address various challenges faced by India's labour market can help to amplify the impact of skill development interventions. One such challenge is low female labour force participation. Out of the country's estimated labour force of 39.52 crore individuals, only 9.16 crore are women.⁹ Skilling initiatives - complemented by a wider push towards empowerment through gender sensitization, creation of economic opportunities, economic and social support - can be leveraged to raise this number. Measures such as providing residential facilities for women trainees, embedding mentoring and coaching in skilling programs, providing social support through mechanisms such as local workshops, have been explored. Enabling women for forms of employment that are more attractive for them, such as gig economy jobs that offer flexible work models, is especially relevant, given that 22.92 crore women (out of the 30.15 crore who are not in the labour force) report their status as 'Attending domestic duties'.¹⁰

Encouragingly, our progress so far in terms of creating access to skill development for women has shown positive outcomes. Over 50% of the candidates trained under PMKVY are women. Significant number of women have also been trained in unconventional roles such as those in electronics and hardware sectors. In our paid courses, women account for 40% of the total trained candidates. Here too women are increasingly enrolling for unconventional job roles, such as field technician, organic grower and automation specialist. Several training providers in our ecosystem focus exclusively on women and are promoting skill training in areas such as digital and financial literacy, entrepreneurial skills, website designing, 2D and 3D designing, hardware repair technician and farm management. Partnerships with industry to support women-centric projects for training women in non-traditional trades such as Computer Numerically Controlled (CNC) operator and Quality Control (QC) inspector in the automotive sector have also been explored.

There are many organizations that are stakeholders in the skill development sector and have gained rich experience and knowledge from their work in the space. The learnings and insights from skills training provision and implementation of innovative models must be leveraged to drive the sector to the next level of performance. Platforms for stakeholders and practitioners to share and disseminate knowledge, to learn from each other's systems, practices and experiences, and to bring on board diverse perspectives, are the need of the hour to encourage new initiatives and collaborations, strengthen institutional knowledge and capability, and research and analytics to deepen the knowledge pool on skills.

Source : NSDC



TOP TRENDS TRANSFORMING THE GLOBAL SUPPLY CHAIN & LOGISTICS INDUSTRY IN 2019

ZAINAB S KAZI

Supply Chain remains the most underrated support function in retail but then its importance cannot be undermined. A weak supply chain results in chaos which ultimately leads to the downfall for any brand/ retail chain. Internationally, supply chain and warehousing is witnessing a tremendous revolution.

With the growing prevalence of Omnichannel retail, the retailer today faces a challenging task of customer expectation fulfillment 24x7. Not only is the customer looking at an enhanced customer service but a seamless experience across channels. Coupled with this, the retailer needs to ensure that his operational costs are under check and the business is strong enough to take care of any unforeseen volatility. A strong supply chain forms the key to taking care of most of the business nuances and the world is today moving over to robotics and automation to take care of this, though trained manpower still remains imperative to successful supply chain operation.

Reiterating this, Samay Kohli, Co-Founder & Chief Executive Officer, Grey Orange (a robotics and warehouse automation company) shares, "The retail evolution calls for a new generation of solutions to address its complexities, which will help retailers create an end-to-end Omnichannel supply chain grounded in the streamlined processes of their fulfillment centers. Automation has a big role to play in this, as it can help minimise inventory duplication and enable a realtime, unified view of inventory across channels."

Kohli further adds that in a modern warehouse, assets and resources need to collaborate with minimal human intervention and with utmost integration across various workflows. This maximises the throughput, as the movement of all resources optimise precisely with the use of AI and machine learning algorithms. A fully-connected robotics system can process large amounts of data in real time to adapt on the fly. Such synchronisation can unlock new areas of productivity, some of which were not considered before.

Elaborating on this, he further adds, "In today's highly dynamic retail landscape, Flexible Automation in distribution centers will be the game changer that can provide the operational excellence that retailers seek." Citing the key global trends, for 2019 to look out for, Anshuman Agarwal, Chief Operating Officer & Co-Founder, INCREFF points out that managing warehousing is becoming a specialised function requiring specialised and trained team.

"With e-commerce and social commerce becoming significant portion of business, warehouses now must pick, pack and dispatch individual customer orders and that too within few hours. This requires a very different capability and mindset." He further states the importance of ensuring on same day replenishment for offline stores saying: "To improve store sell through, warehouses now must replenish stock faster in shorter batch sizes. The trend is also to imbibe digital automation instead of physical automation

which entails automating decision making in warehouses through digital automation. Turn humans into robots – let systems take all decisions, workers should only follow instructions."

Talking about inventory, Agarwal accentuates the trend internationally that is about exposing a single view of inventory. He explains, "With proliferation of sales channels (e.g. E-commerce marketplaces, own websites, LFRs, EBOs, MBOs etc.) having dedicated stocks for each channel results in huge loss of revenue and margin. It is critical to expose single view of inventory to all sales without having safety buffers or dedicated stock for any sales channels. It is equally important to be closer to the customer. This means having a distributed warehousing with intelligent stock allocation based on demand pattern, so that the retailer can fulfill all customer orders from closest warehouse there by reducing delivery time and cost and improving customer experience."

Top Trends Expected to Transform the Global Supply Chain/ Logistics Industry in 2019

BLOCKCHAIN TECHNOLOGY: With the superpower of allowing the different stakeholders – manufacturers, suppliers, customers, auditors, warehouse managers and a host of others – to create an efficient system for recording transactions, tracking assets and easy accessibility of document management, Blockchain Technology is to be watched out for!

COMPLETE DIGITALISATION: Enabling a reduction in supply chain cost and offering a fool proof solution devoid of any possible human error, digitalisation is going to sweep over the traditional methods.

Growing prevalence of 3PL and 5PL

PROFICIENT LAST MILE DELIVERIES: Thanks to e-commerce, there is a growing proliferation of last mile deliveries occupying a critical position. An example here would be the initiative by Amazon to workout logistics to offer same day delivery to their Prime Members.

DRONES MAKING DELIVERIES: Experimentation is ongoing in this space and the pace is only going to increase in 2019

BIG DATA ADOPTION: The use of Big Data and Data Analytics will be a force to reckon with in 2019 for supply chain operation

ELASTIC LOGISTIC: As the name suggests, this is all about bringing in flexibility that allows to expand and shrink capabilities for aligning with the demand dynamics within the supply chain during a time frame.

OPTING FOR GREEN SOLUTIONS: With online shopping increasing by the day, the number of vehicles being used for deliveries too are growing. Logistic companies will have to look out for green solutions that include making use of electric vehicles, drones etc.

Source : www.indiaretailing.com

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GOVERNMENT COMMITS TO REGULATORY CHANGES; PROPOSES REFORMS TO BOOST ECONOMIC GROWTH

VARSHA BHATTACHARYA AND ASHISH SODHANI
NISHITH DESAI ASSOCIATES

Press Conference held by Finance Minister announced a number of changes in line with industry asks, centered around six broad themes, in order to boost economic growth.

- Following tax law changes proposed:

- Higher surcharge on capital gains removed for long-term and short-term capital gains tax on listed shares for both domestic and non-resident investors. Foreign Portfolio Investors have also been exempted from higher surcharge on derivative transactions.
- Measures to rationalize 'angel tax': CBDT circulars to streamline tax assessment for startups seeking exemption from angel tax; and to extend exemption to startups assessed prior to February 19, 2019.
- Press Conference statement by Finance Minister to make angel tax inapplicable to startups registered with DPIIT.
- Changes to simplify tax administration, and to curb opportunities for harassment of taxpayers.

- Stated commitment of Ministry of Finance to ensure continued engagement with stakeholders for different sectors. Promise of more changes to come, and statements made in Press Conference being a part of ongoing reform.

In a rare move, the Union Finance Minister Smt. Nirmala Sitharaman ("**FM**") held a Press Conference on August 23, 2019 ("**Press Conference**"), announcing several legal and regulatory changes the Indian Government already has and further wants to introduce in an effort to boost the growth of the Indian economy. These changes range from tax related amendments addressing startup taxation to labour law amendments, and the announcements come in succession to many such piecemeal measures by the Government over the past few months.

Six broad themes were sought to be addressed in the changes:

- a. Simplification, reduction in harassment by authorities, and decriminalization of minor infringements to increase the ease of doing business in India;
- b. Measures to encourage investment and enterprise in India;
- c. Strengthening of the banking and credit system;
- d. Measures to aid liquidity for Non-Banking Finance Companies ("**NBFCs**") and Housing Finance Companies ("**HFCs**"), with focus on boost for Micro, Small and Medium Enterprises ("**MSMEs**");
- e. Increase of capital flow in Indian financial markets; and
- f. Addressing issues impeding the growth of the automotive sector.

To implement the theme of simplification and reduction in harassment, the Government has introduced measures to ease the process of tax compliance and interaction with tax authorities such as enabling pre-filled income tax returns and implementing faceless scrutiny proceedings. Much required measures to simplify labour laws have been brought in, including making inspection procedures web-based and setting a timeline for uploading of inspection report, ability to compound labour law offences, introduction of self-certification of startups, reduction of employees' state insurance contribution from 6.5% to 4%. Environmental clearances for MSMEs have been simplified via a single air and water clearance, and the requirement of single consent to set up a factory.

On the corporate side, introduction of one-day incorporation, simpler approvals for mergers and acquisitions, decriminalization of several offences, and a robust framework under the Insolvency and Bankruptcy Code, 2019 are some measures introduced to ease the compliance burden on companies in India.

To promote investment and enterprise in India, the Government has declared that the violation of the spending requirement of 2% of profits toward Corporate Social Responsibility will not be treated as a criminal offence, and that the Ministry of Corporate Affairs is reviewing relevant sections of the Companies Act, 2013 to implement this change. A faceless notification system is to be implemented by October 1, 2019 to curb harassment by income tax authorities. Higher surcharge brought in by Budget 2019 has been removed on long-term and short-term capital gains tax on listed shares for both domestic and non-resident investors. Foreign Portfolio Investors ("**FPIs**") have also been exempted from higher surcharge on derivative transactions. To address the angel tax concerns of the startup sector, it is stated that the angel tax under Section 56(2)(viib) will not be applicable to startups registered with the Department for Promotion of Industry and Internal Trade ("**DPIIT**"), and a dedicated cell will be set up by the Central Board of Direct Taxes ("**CBDT**") to address concerns of startups.

In order to strengthen the country's financial systems, the Government has committed to an upfront capital infusion of INR 700 billion to public sector banks. The FM also conveyed a commitment of banks passing on effects of interest rate cuts, to make housing, vehicle and retail loans cheaper. To aid NBFCs and HFCs, the FM declared that NBFCs will be able to use Aadhaar-authenticated KYC for easier customer onboarding, and necessary changes would be brought in to the Prevention of Money Laundering Act, 2002 and Aadhaar regulations. Similar enabling provisions are expected to allow Aadhaar-based KYC for opening demat accounts, and for investment in mutual funds. The one-time Partial Credit Guarantee scheme of INR 1 trillion for purchase of pooled assets of NBFCs and HFCs will be monitored closely by banks, as will be the issuing of prepayment notices to NBFCs. Co-origination of loans by

NBFCs and public sector banks is to be fast-tracked.

To increase capital flows in India, creation of an organization has been proposed to provide credit enhancement for housing and infrastructure projects. Action is expected to be taken on development of credit default swap markets, in consultation with the Reserve Bank of India ("RBI") and the Securities and Exchange Board of India ("SEBI"). The RBI will work with the Ministry of Finance for measures to improve the market for bonds in India. The SEBI is expected to soon operationalize the Depository Receipt Scheme, 2014, which will potentially increase access of foreign funds to Indian debt markets through American or Global Depository Receipts. It is expected that recent simplification of KYC norms by the SEBI for foreign investors, including FPIs, will increase market access. The FM also stated that the Ministry of Finance and the RBI are working to introduce measures for bringing the offshore rupee market to domestic stock exchanges, and to permit USD-INR derivatives trading in GIFT City IFSC in Gujarat (India's first International Financial Services Centre).

To address infrastructural issues, the FM mentioned a few measures which will be taken, such as monitoring of delayed payments by the Government and performance review by the Cabinet Secretariat. 75% of arbitration awards in contractual disputes with the Government are to be paid, which will be implemented and monitored by the Cabinet Secretariat. An Inter-Ministerial Task Force by the Department of Economic Affairs will be set up to finalize pipeline of infrastructure projects which will be monitored actively, and which is expected to increase investment and create jobs.

Below we have looked at the tax law changes the government seeks to bring in.

HIGH SURCHARGE ON SPECIAL RATES OF CAPITAL GAINS REMOVED

The Budget 2019 introduced a higher surcharge on tax for high income earning groups. While the FM in her budget speech indicated that there would be an enhanced surcharge on individuals having taxable income from INR 20 million to INR 50 million, and INR 50 million and above so that effective tax rates for these two categories will increase by around 3% and 7% respectively, the fine print of the Finance Bill had a different story to tell. The higher surcharge became applicable not only to individuals but also to Hindu Undivided Families, Association of Persons, Body of Individuals and every artificial juridical person. This meant that trusts earning such income became subject to the higher tax which resulted in increase of effective tax rates for the FPIs set up as trusts and the Category III Alternate Investment Funds ("Cat III AIFs") to as high as 42.7%. In contrast there has been no change in tax rates for FPIs set up as corporate vehicles. This had become a cause of concern for a large part of the funds industry and resulted in being one of the major factors behind investors losing more than INR 5 trillion in market wealth recently¹.

Acknowledging the higher tax rate's impact on investment in Indian capital markets, the FM in her Press Conference stated the government would withdraw the higher surcharge to the extent applicable to long term and short-term capital gains tax on listed (i) equity shares; (ii) unit of an equity-oriented fund; and (iii) unit of a business trust. Additionally, in respect of FPIs the tax payable on gains arising from the transfer of derivatives (futures & options) would also be exempted from the levy of the enhanced surcharge.

This was followed by a Press Release from the CBDT issued on August 24, 2019. To summarize, the Press Release provides that the enhanced surcharge shall be withdrawn on tax payable by both domestic as well as foreign investors on long-term and short-term capital gains arising from the transfer of equity shares in a company or unit of an equity-oriented fund/business trust which are liable for Securities Transaction Tax, and also on tax payable by FPIs on the capital gains arising from the transfer of derivatives. However, the tax payable at normal rates on the business income arising from the transfer of derivatives to a person other than FPI shall be liable for the enhanced surcharge. This would mean CAT III AIFs set up as trusts would still be subject to the higher rate of surcharge as there is no pass-through available to CAT III AIFs and income earned by them from sources other than capital gains is considered as business income.

Several representations by stakeholders were made to relevant authorities in order to resolve this issue, and hence this was much awaited and as such comes as much-needed relief. However, it will be interesting to see how these changes will be brought about in the Income Tax Act, 1961 ("ITA"). The ITA is amended by way of a Finance Bill which is passed by both houses of the Indian Parliament, post which the President gives his assent which is then gazetted. Notably, the Finance Bill is introduced during the budget session of the Parliament. Considering that the amendments that will need to be brought about are substantive in nature, the question arises whether these can be brought about by way of a circular issued by the CBDT under Section 119 of the ITA, i.e. through an executive order; or whether legislation by way of an amendment bill would need to be passed in Parliament followed by the President giving his assent. Section 119 of the ITA provides for 'instructions to subordinate authorities' and states that the CBDT may issue directions or instructions 'for the purpose of proper and efficient management of assessment and collection of revenue' or if it is of the 'opinion that it is necessary in the public interest' and is therefore wide enough to carry out such changes. In the past, the CBDT has provided relaxations under various provisions of the ITA by way of a circular followed by changes made in the ITA in the next budget. The Cabinet chaired by the Prime Minister is reported to also be considering introducing an ordinance to effectuate the change.² The coming days will tell us how the Government is going to bring about the changes.

Further, the scope of the relaxations currently proposed are narrow. They do not cover interest income arising to FPIs from bonds, which can otherwise avail concessional tax rates under the ITA. Additionally, capital gains on transfer of bonds for FPIs which are set up in non-treaty jurisdictions continue to be affected as there is no exemption on the higher surcharge for such transfers. Therefore, FPIs set up as trusts and Cat III AIFs will still be subject to a disproportionately higher effective tax rate owing to the higher surcharge, as compared to their counterparts set up as corporates.

Additionally, these changes are going to result in logistical and administrative difficulties for taxpayers while paying taxes and filing tax returns. This is because surcharge is agnostic to head of income and is generally applicable on the total tax payable by the taxpayer. However, with these changes, the surcharge will have to be separately calculated for sub-heads of income and then added to the total income on which also the surcharge will have to be calculated separately. This may cause confusion for domestic investors who earn capital gains from various

sources and not just through listed equity.

ANGEL TAX EXEMPTION

Section 56 of the ITA seeks to tax 'income from other sources' of a taxpayer, being income that is chargeable under the ITA but is not taxed under other heads of income. While sub-section (1) articulates the general provision, sub-section (2) enlists specific types of income which would be chargeable under Section 56. Section 56(2)(viib) is a tax on a private company on issuance of shares if such shares are issued at a price higher than their fair market value. The provision exempts situations where the consideration is received by: (a) non-resident; (b) a venture capital undertaking from a venture capital company or fund; or (c) by a company from a class or class of persons notified by the Central Government.

The provision proved particularly egregious to startups and early stage companies with limited capital, that would be required to part with a significant portion of funds obtained by them from investors in lieu of equity – hence the phrase 'angel tax'. The Government has, in recognition of this hardship, issued various notifications time and again under exemption (c) mentioned above to provide thrust to the start-up eco-system. The CBDT has provided an exemption from levy of angel tax to 'startup' companies that receive consideration from an Indian resident, and that fulfil conditions prescribed under the current DPIIT Notification,³ and files the declaration required under the DPIIT Notification. Additionally, in case additions are made by the Assessing Officer ("AO") after modification or rejection of valuation of the shares based on Rule 11UA(2) of the Income Tax Rules, 1962, no coercive measures are to be undertaken to recover outstanding tax demand, and cases pending before the first appellate authority were to be expeditiously disposed of by March 31, 2018.

Pursuant to the above, with an aim to streamline the assessment process for startups seeking exemption from applicability of Section 56(2)(viib) of the ITA and with a view to ease the process of assessment for these startups, the CBDT has prescribed the following procedure:⁴

- Where the startup has been recognized by the DPIIT, but the case is selected for 'limited scrutiny' only to determine applicability of Section 56(2)(viib) – the contentions of startups are to be summarily accepted without any inquiry or verification by the AO.
- Where the startup has been recognized by the DPIIT, but the case is selected under 'limited scrutiny' with multiple issues for determination or 'complete scrutiny', including determination of applicability of Section 56(2)(viib) – applicability of 56(2)(viib) will not be pursued during assessment, and inquiry or verification on other issues shall be carried out by the AO as per due procedure under the ITA, but after obtaining approval of the supervisory officer.
- Where the startup has not been recognized by the DPIIT, and the case is selected for scrutiny inter alia on grounds of applicability of Section 56(2)(viib) – inquiry or verification on all issues shall be carried out by the AO as per due procedure under the ITA, but after obtaining approval of the supervisory officer.

The CBDT also clarified⁵ that the exemption from Section 56(2)(viib) which only applied to startups for which assessment order were passed after the date of DPIIT Notification (i.e. after February 19, 2019), would also extend to for cases where assessment order was passed before the DPIIT Notification.

In the Press Conference on August 23, 2019, the FM also declared that startups recognized by the DPIIT will be exempt from application of the angel tax altogether. Application for startup recognition can be made **here**. However, it remains to be seen how this change will be implemented, and whether further amendments or notifications will be brought in to ease the process of availing the exemption.

The streamlining for startups for claiming angel tax exemption, in particular, signifies that the Government is hearing the stakeholders and is trying to work with the industry to create a beneficial regulatory environment. The FM in the Press Conference specifically stated the commitment of the Ministry of Finance to engage with the industry, and that many other changes are in the pipeline to ease the process of doing business in India.

SIMPLIFICATION OF TAX ADMINISTRATION

The FM during the budget for the year had indicated various measures to ease tax administration and make it more accessible for the common man. In the Press Conference, the FM asserted this intention of the government which are going to be executed in the coming days. Some measures that were mentioned are:

- Introduction of pre-filled Income Tax returns;
- Faceless tax scrutiny process to commence from October 1, 2019 to preclude instances of harassment by tax authorities:
- All notices, summons or orders issued after October 1, 2019 are to be issued through a centralized computer system, which will contain a unique document identification number;
- Communication without the document identification number are to be regarded as non est in law;
- Older notices are to be decided before October 1, 2019; or to be re-issued through the new system;
- Notice from October 1, 2019 to be disposed of within 3 months from reply.
- Returns to be filed under Goods and Services Tax ("GST") regime to be simplified;
- Process to obtain refund of GST to be simplified.

Footnote

- 1 <https://www.businesstoday.in/markets/stocks/sensex-nifty-investor-lose-market-wealth-post-union-budget/story/362630.html>
- 2 <https://www.indiatoday.in/business/story/cabinet-may-relax-fdi-in-retail-okay-ordinance-to-roll-back-fpi-surcharge-1592348-2019-08-28>
- 3 DPIIT Notification No. G.S.R. 127 (E) dated February 19, 2019
- 4 CBDT Circular No. 16 of 2019 dated August 7, 2019
- 5 CBDT Clarification [F.No. 173/354/2019-ITA-1] dated August 9, 2019

The content of this article is intended to provide a general guide to the subject matter. Specialist advice should be sought about your specific circumstances.

Source : www.mondaq.com

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GOODS TAKEN OUT OF INDIA FOR EXHIBITIONS – TREATMENT UNDER GST

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Several goods are taken out of India on consignment basis for exhibitions or other export promotion events. These goods are sold only when approved by the prospective customers abroad. The unsold goods are then brought back to India. This is a widespread practice in various sectors, including the gems and jewelry industry.

Exporters of these items were facing problems due to the lack of clarity on the procedure to be followed under GST at the time of taking these goods out of India and at the time of their subsequent sale or return to India. Taking cognizance of these problems and in order to help exporters, the **Central Board of Indirect Taxes and Customs (CBIC)** has now issued a comprehensive clarification in this regard vide **Circular No. 108/27/2019-GST dated 18.07.2019**.

Clarifications: It is clarified that the activity of sending / taking the goods out of India for exhibition or on consignment basis for export promotion, except when such activity satisfy the tests laid down in Schedule I of the CGST Act (hereinafter referred to as the “specified goods”), do not constitute supply as the said activity does not fall within the scope of section 7 of the CGST Act as there is no consideration at that point in time. Since such activity is not a supply, the same cannot be considered as ‘Zero Rated Supply’ as per the provisions contained in section 16 of the IGST Act.

Understanding the applicability of ‘supply’ and ‘zero-rated supply’

In the circular, the **Central Board of Indirect Taxes and Customs (CBEC)** clarified that any activity/transaction would be treated as ‘supply’ only if the following two conditions are satisfied:

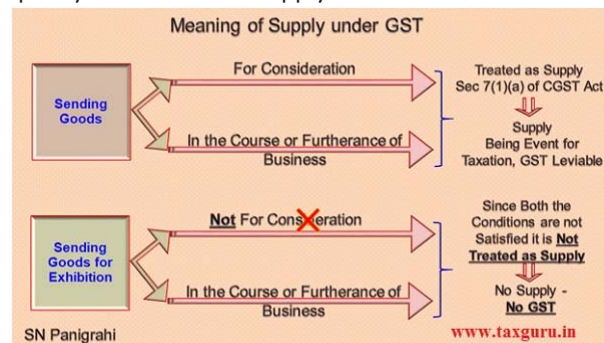
- Such activity/transaction should be done for consideration; and
- Such activity/transaction should be done in the course or furtherance of the business.

When the goods are sent/taken out of India for exhibition or on the consignment basis for export promotion, the same would not come within the ambit of ‘supply’ in as much as there is no consideration involved at any point of time.

With regard to the applicability of ‘zero-rated supply’, it has been clarified that only ‘supplies’ which are either export or are supply to **Special Economic Zone** unit/developer would qualify as **zero-rated supply**.

Since the goods sent/taken out of India **does not qualify**

as ‘supply’, consequently, the same would also not qualify as ‘zero-rated supply’.



Further Clarifications : Since the activity of sending / taking specified goods out of India is not a supply, doubts have been raised by the trade and industry on issues relating to maintenance of records, issuance of delivery challan / tax invoice etc. These issues have been examined and the clarification on each of these points is as under: –

Issue : 1

Whether any records are required to be maintained by registered person for sending / taking specified goods out of India?

Clarification : The registered person dealing in specified goods shall maintain a record of such goods as per the format at Annexure to this Circular.

Record of Specified Goods Sent / Taken out of India & Brought Back / Sold Abroad																	
Folio No.	Description of specified goods	Quantity Unit	Value per unit	Total value of the specified goods	Date of removal	Delivery challan	Shipping bill	Details of goods supplied but not brought back	Invoice	Details of specified goods brought back	Bill of Entry						
(1)	(2)	(3)	(4)	(5)	(6)	No	Date	No	Date	Qty	Value	No	Date	Qty	Value	No	Date

Issue : 2

What is the documentation required for sending / taking the specified goods out of India?

Clarifications

- As clarified above, the activity of sending / taking specified goods out of India is not a supply.
- The said activity is in the nature of “sale on approval basis” wherein the goods are sent / taken outside India for the approval of the person located abroad and it is only when the said goods are approved that the actual supply from the exporter located in

India to the importer located abroad takes place. The activity of sending / taking specified goods is covered under the provisions of sub-section (7) of section 31 of the CGST Act read with rule 55 of **Central Goods & Services Tax Rules, 2017** (hereinafter referred to as the "CGST Rules").

- c) The specified goods shall be accompanied with a delivery challan issued in accordance with the provisions contained in rule 55 of the CGST Rules.
- d) As clarified in paragraph 6 above, the activity of sending / taking specified goods out of India is not a zero-rated supply. That being the case, execution of a bond or LUT, as required under section 16 of the I GST Act, is not required.

Issue : 3

When is the supply of specified goods sent / taken out of India said to take place?

Clarifications

- a) The specified goods sent / taken out of India are required to be either sold or brought back within the stipulated period of six months from the date of removal as per the provisions contained in sub section (7) of section 31 of the CGST Act.
- b) The supply would be deemed to have taken place, on the expiry of six months from the date of removal, if the specified goods are neither sold abroad nor brought back within the said period.
- c) If the specified goods are sold abroad, fully or partially, within the specified period of six months, the supply is effected, in respect of quantity so sold, on the date of such sale.

Issue : 4

Whether invoice is required to be issued when the specified goods sent / taken out of India are not brought back, either fully or partially, within the stipulated period?

Clarifications

- a) When the specified goods sent / taken out of India have been sold fully or partially, within the stipulated period of six months, as laid down in sub-section (7) of section 31 of the CGST Act, the sender shall issue a tax invoice in respect of such quantity of specified goods which has been sold abroad, in accordance with the provisions contained in section 12 and section 31 of the CGST Act read with rule 46 of the CGST Rules.
- b) When the specified goods sent / taken out of India have neither been sold nor brought back, either fully or partially, within the stipulated period of six months, as laid down in sub-section (7) of section 31 of the CGST Act, the sender shall issue a tax invoice on the date of expiry of six months from the date of removal, in respect of such quantity of specified goods which have neither been sold nor brought back, in accordance with the provisions contained in section 12 and section 31 of the CGST Act read with rule 46 of the CGST Rules.

Issue : 5

Whether the refund claims can be preferred in respect of specified goods sent / taken out of India but not brought back?

Clarifications

- a) As clarified in para 5 above, the activity of sending /taking specified goods out of India is not a zero-rated supply. That being the case, the sender of goods cannot prefer any refund claim when the specified goods are sent / taken out of India
- b) It has further been clarified in answer to question no. 3 above that the **supply would be deemed to have taken place:**
 - (i) on the date of expiry of six months from the date of removal, if the specified goods are neither sold nor brought back within the said period; or
 - (ii) on the date of sale, in respect of such quantity of specified goods which have been sold abroad within the specified period of six months
- c) It is clarified accordingly that the sender can prefer refund claim even when the specified goods were sent / taken out of India without execution of a bond or LUT, if he is otherwise eligible for refund as per the provisions contained in sub-section (3) of section 54 the CGST Act read with sub-rule (4) of rule 89 of the CGST Rules, in respect of zero rated supply of goods after he has issued the tax invoice on the dates as has been clarified in answer to the question no. 4 above. It is further clarified that refund claim cannot be preferred under rule 96 of CGST Rules as supply is taking place at a time after the goods have already been sent / taken out of India earlier.



Refund Claim

Question of refund claim arises only in the following two cases:

- Goods sent out of India is not bought back within the stipulated time of 6 months; or
- Goods sent out of India are sold out.

As seen above, goods sent / taken out of India is not covered within the scope of '**zero-rated supply**' and hence accordingly execution of a bond or LUT is not required.

With regard to the refund claim it has been clarified

that, even if the sender has not executed bond or LUT, he would be eligible for refund claim as per provisions of section 54(3) read with rule 89(4) of the CGST Rules.

However, refund claim cannot be filed under rule 96 of the CGST Rules reason being the supply has taken place at a time after the goods have already been sent / taken out of India.



Illustrations

Case – 1

- M/s ABC sends 100 units of specified goods out of India. The activity of merely sending / taking such specified goods out of India is **not a supply**.
- No tax invoice** is required to be issued in this case but the specified goods shall be accompanied with a **delivery challan** issued in accordance with the provisions contained in rule 55 of the CGST Rules.
- In case the entire quantity of specified goods is **brought back within the stipulated period of six months** from the date of removal, **no tax invoice is required** to be issued as no supply has taken place in such a case.
- In case, however, the entire quantity of specified goods is neither sold nor brought back within six months from the date of removal, a tax invoice would be required to be issued for entire 100 units of specified goods in accordance with the provisions contained in section 12 and section 31 of the CGST Act read with rule 46 of the CGST Rules within the time period stipulated under sub-section (7) of section 31 of the CGST Act.

Case – 2

M/s ABC sends 100 units of specified goods out of India. The activity of sending / taking such specified goods out of India is not a supply.

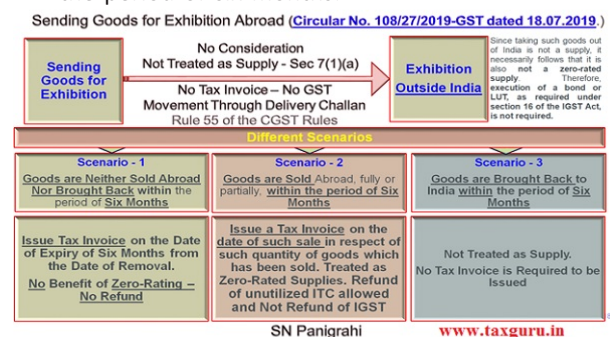
No tax invoice is required to be issued in this case but the specified goods shall be accompanied with a delivery challan issued in accordance with the provisions contained in rule 55 of the CGST Rules. If 10 units of specified goods are sold abroad say after one month of sending / taking out and another 50 units are sold say after two months of sending / taking out, **a tax invoice would be required to be issued for 10 units and 50 units, as the case may be, at the time of each of such sale** in accordance with the provisions contained in section 12 and section 31 of the CGST Act read with rule 46 of the CGST Rules.

If the remaining 40 units are not brought back within the stipulated period of six months from the date of removal, a tax invoice would be required to be issued for 40 units in accordance with the provisions contained in section 12 and section 31 of the CGST Act read with rule 46 of the CGST Rules.

Further, M/s ABC may **claim refund of accumulated input tax credit** in accordance with the provisions contained in sub-section (3) of section 54 of the CGST Act read with sub-rule (4) of rule 89 of the CGST Rules in respect of zero-rated supply of 60 units.

Summary of The key points clarified in the Circular are as following:

- The activity of taking goods out of India on consignment basis for exhibition would **not in itself constitute a supply under GST since there is no consideration received at this time**.
- The movement of these goods out of India shall be accompanied by a delivery challan issued in accordance with the provisions contained in rule 55 of the CGST Rules.
- Since taking such goods out of India is not a supply, it necessarily follows that it is also not a zero-rated supply. Therefore, execution of a bond or LUT, as required under section 16 of the IGST Act, is not required.
- The goods taken out of India in this manner are required to be either sold or brought back within a period of six months from the date of removal.
- The supply would be deemed to have taken place if the goods are neither sold abroad nor brought back within the period of six months. In this case, the sender shall issue a tax invoice on the date of expiry of six months from the date of removal, in respect of the quantity of goods which have neither been sold nor brought back. The benefit of zero-rating, including refund, shall not be available in respect of such supplies.
- If the specified goods are sold abroad, fully or partially, within the period of six months, the supply shall be held to have been effected, in respect of the quantity so sold, on the date of such sale. In this case, the sender shall issue a tax invoice in respect of such quantity of goods which has been sold. These supplies shall become zero-rated supplies at the time of issuance of invoice. However, refund in relation to such supplies shall be available only as refund of unutilized ITC and not as refund of IGST.
- No tax invoice is required to be issued in respect of goods which are brought back to India within the period of six months.



Disclaimer : The views and opinions; thoughts and assumptions; analysis and conclusions expressed in this article are those of the authors and do not necessarily reflect any legal standing.

INTEGRATING WAREHOUSE MANAGEMENT SYSTEM WITH PRODUCTION PLANNING AND SCHEDULING

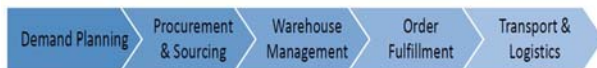
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Introduction

In supply chain and manufacturing, space and time are expenses. There's one point where products stop & move, and they consume both, that's where warehouse lies in a supply chain.

Optimising operations in warehouse and using it to trigger & control manufacturing at preceding stations could be a powerful step to control OTiF and stocks. This could work better with a WMS setup installed and possibly even include changeover intervals.

Elements of a supply chain:



Efficiency of a Supply Chain is highly dependent on its product distribution, space utilisation and overall flow within the system. Warehousing has been in around since long. It dates back to centuries before where they were used to store grains and elementally has been evolving over ages.

By 2006, as SaaS (Software-as-a-Service) platforms developed the management of warehouses & distribution centres in software via cloud, ERPs, Warehouse Management Systems.

A Warehouse Management System software tracks inventory, stores data, monitors inbound and outbound shipping, picking etc... With data collected a WMS generates reports of picklist for purchase orders, inventory or stock data, aging reports, daily dispatch reports and more. These reports are primarily used for Planning, Scheduling picks & picklists, Staffing and Reporting. Use of WMS has had a profound impact on Supply Chain functionalities by providing milestones, providing reports & performance analysis helping teams solve problems in timely way.

But that's about WMS and its benefits, going back to the concern over time and space, an integrated platform of WMS and use of models on scheduling can further optimise space requirements and project changeovers and quantity per lot at preceding operations as per stock levels.

The objective of this paper is to explore potential in integrating WMS with production planning and

scheduling. As for models in use, we're using EPEI (Every part every interval),

Changeover frequencies and Re-order Levels to optimise the Stock Quantity, Runner/repeater models and potentially even raise tickets. Integration of these models to WMS Software would help companies control their inventory while keeping substantial measures for delivery and plan changeovers in advance.

Functions of the models in use:

- **Re-order Level:** To identify the minimum stock quantity that can be kept for a particular SKU and its consumption in association to other SKUs. At re-order level of stock WMS will notify admin of replenishment order.
- **EPEI:** Is a model to identify optimum run quantities post one changeover. In our case, the EPEI model will identify the same for the preceding operation and further be used to optimise the number of changeovers at the station.
- **A, B, C Class:** The classification of SKUs as per their consumption rate. The part with 60% of demand being runner, 20% repeater & 20% stranger. For an overall stock level of (say) 15 days, runner will hold 10 days of stock, repeated of 15 days & stranger of 30 days. The same principle to be used for guiding changeover frequencies of respective SKUs.

1. Flow of materials and information:

Depicted below is a map of material flow within a system of WMS installed at a glass factory:



Glass RM > Glass Factory > Furnace + Annealing > Barcoding > Warehouse > Pick & scan > Process & pack > Ship to PO

The preceding operation here is of a furnace. Change of mould is taken as changeover, and the annealed glass from furnace is stored (SFG) for a month. This curing period is given so that sorting team can identify and remove broken glasses which would appear normal in the heated state.

This one-month period gets tricky to manage for every bundle stored and hence its likely or suggested that they have a WMS which identifies & stores information

of each bundles separately and allocates point of storage and date of forming/spinning in furnace.

Basic process flow of WMS:

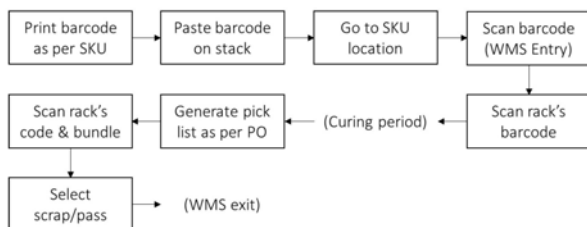
WMS comes in demand when the inflow and outflow of material from a warehouse becomes difficult through spreadsheets. A WMS usually receives orders from an overlying host (ERP) and acts as a bridge between the physical warehouse and ERP itself. Data is transferred to ERP via push/pull or export to other documents.

Having a complete warehouse management solution could help the company with many minor/secondary functions like receiving, inspection & acceptance (keeping record of rejects), put-away, internal replenishments, pick positions, order assembly on shipping dock, documentations (Purchase & Sales Order, Dispatch documents) and shipping.

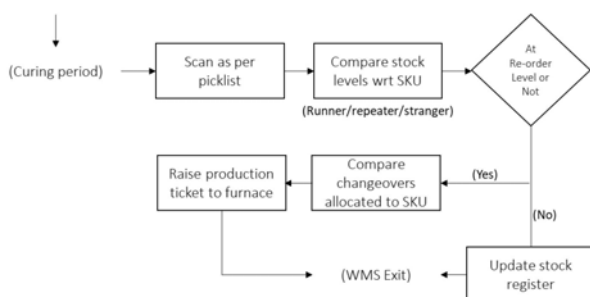
And a basic WMS could serve the major functions like tracking storage and retrieval of goods in the physical warehouse.

Many means could be adopted for tracking the same. There are companies adopting RFID tags which automatically feed data into the software as goods pass through the gates, then there are companies that use barcode which demands a stop at entry and exit points to scan these goods being passed to next station.

Irrespective of technology adopted and the complexity of software, the generic flow of the WMS remains the same and that's more or less the same as shown below. Rest of the options are served from what happens at the backend in the software –



WMS with EPEI Model: Back end bit of activity will be like block figure below, that shows interaction of WMS with EPEI in either of suites installed:



A WMS software could either be a standalone software

or a part of ERP Installed with the company. If its ERP or some part of supply chain suite, we get two benefits over standalone, one being directly able to pull other data and keeping all models dynamic. And other benefit of not having to update manually to the other standalone softwares that the company already has or incorporates as they move forward.

In case of a standalone type, the software will need to be pre-fed with SKU category, replenishment level and programmed with maximum changeovers possible in the system. It also should be able to select the appropriate sequence of changeover from matrix.

2. Variables in use & calculations:

To ensure the quantity stored in warehouse is optimised, we're following trigger mechanisms to raise production orders to preceding station and to understand when to trigger these tickets to preceding stations we're using the models that were defined earlier.

Now, let's understand how to arrive at these numbers of available changeovers and economic production quantities per run and re-order levels as per SKUs.

Step 1: List down all parts to be stored in warehouse with their sales quantity over (say) last 6 month/put the demand forecasted for (say) next 3 months

The interval taken is only indicating acceptable range, overall the objective is only to understand the volume of storage quantity required per SKU, and with an estimate of lead time from furnace to be used under replenishment stage.

Estimate using arbitrary figures:

SNo.	Part Name ()	Demand Months) Pcs	Conversion ratio Wt	Demand Month	Vol %	SKU Type
1	AR125	672048	0.45	100807	29%	A
2	BM240	612000	0.45	91800	27%	A
3	CRS120	554040	0.24	44323	13%	B
4	..	576000	0.13	24960	7%	B
5	..	207000	0.24	16560	5%	B
6	..	156024	0.175	9101	3%	C
7	..	9900	0.5	1650	0%	C
8	..	144000	0.4	19200	6%	C
9	..	299448	0.17	16969	5%	C
10	JR400	299448	0.17	16969	5%	C

Total storage quantity required (for AR125):

Lead time: 18 Hours + 1 day = 42 hours Consumption/day: 3360 Kg/day

Re-order Level: Lead time consumption + Safety Stock = 5880 + 500 = 6380 Kgs

**Re-order level can also be set as per Kanban calculations provided EPQ is calculated. No of bins = Lead time consumption (LTC) ÷ Economic production quantity (EPQ)

If 2 Bins, Bin Quantity = Roundup ((LTC-EPQ) ÷ Pack Size),0) * Pack Size If N Bins, Bin Quantity = EPQ

Step 2: Estimate the total available changeovers for the set demand and calculate the available time

Once the above calculation is done, we know the replenishment level. Now, to limit the number of changeovers we need to identify interval between two changeovers. The total available changeovers are to be estimated based on EPEI model:

EPEI example:

SNo.	Part Name ()	Changeover time
1	AR125	33
2	BM240	34
3	CRS120	33

$EPEI = (\text{Sum of total changeover time/day}) \div (\text{Available time for changeovers/day}) = 100/75 = 1.33 \text{ Days}$

This number indicates the minimum period between two changeovers. And total available time for changeovers is directly derived with amount of time available after supplying to demand and accounting to some percentages for breakdown and management losses.

But this amount of quantity produced during 1.33 days may not supply to complete order, if that be the case. Another step is added to prevent short supply of part.

Step 3: Categorise the parts to runner repeater strangers to allocate the scheduling bucket allowed i.e., (If Runner 10 days, Repeater 15 Days, Stranger 30 Days)

Now once we know the materials that are at re-order levels and minimum amount to be run for minimum demanded uptime, we need to further understand whether the taken quantity is sufficient to the orders already placed by customer.

That means output of required quantity will be larger number calculated from Step 2 & Step 3.

Let's take the following container plan sheet to understand how the orders will be allocated

for production sequence –

Part Description			Orders				
SNo.	Part Name ()	Category	Week 1	Week 2	Week 3	Week 4	Week 5
1	AR125	Runner			1		1
2	BM240	Runner		1	1		
3	CRS120	Repeater	1			1	
4	..	Repeater		1			
5	..	Repeater					
6	..	Stranger		1			1
7	..	Stranger					

Which material to be taken into production, for that WMS will be interacting with the container plan sheet or the sales order sheet directly to prioritize the production sequence.

Here, the shaded region indicates the articles that could be taken into planning, and by following the model as per runner repeater & stranger sequence as shown above, we're ensuring that we're taking inventory batch size as per part category.

Here, for ex. though replenishment levels have reached for article 1 & 2, order will be triggered for 3rd first and then 4th and 6th. Post which in next cycle, order will be triggered for 2nd and then 1st in the next cycle.

**Strangers do not have replenishment levels, hence it'll be taken directly if order is within 30 days.

Step 4: Use the data to simulate the actual production possible and prepare MPS

The above steps will give us the production sequence for replenishments and compares the order quantity to customer orders placed. Also, EPEI ensures, that changeover request is not raised for shorter run time than required run.

EPEI is not integrated to re-order level to keep it dynamic on monthly demands.

4th step is manual intervention by us, where we simulate and project the actual production quantity for week/month and re-order the sequence. It may depend on any urgent order you may need to process sooner or a trial that needs to be conducted...

Note: For a better estimate at the production quantity that's possible, we'll need to first prepare a changeover matrix too, that indicates the changeover time between two arbitrary parts. The need of such a step is possibility on difference in changeover times for "A part" to "B part" and "A part" to "C part".

3. Conclusion:

Integrating WMS for management of inward / outward and to reduce search time of articles is done by many groups. The initiative is mostly taken forward because of having to manage a large sized warehouse or number of SKUs or mismatch found in stock taking activity lead by accounts. But, then again, warehouse being a powerful and costly element in supply chain it has to be used for planning and scheduling bit.

Integrating the above models or other models with EPQ itself could help us achieve beyond the original problem of over flowing stocks which is more often overlooked while going for WMS.

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BLOCKCHAIN – THE NEXT OF EVERYTHING !!!

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With modernization in lifestyle and evolution of technology, its acceptance in day to day life and business has increased never before. If Artificial Intelligence (AI) and Internet of Things (IoT) are buzzwords of last decade, then the upcoming decade is of “Blockchain Technology” for sure. It is a revolutionary technology which is operating most popular cryptocurrency namely “Bitcoin” – It is first successful application of Blockchain came into existence in the year of 2009 by Satoshi Nakamoto. The Economist described the Blockchain as the most important advancement in recordkeeping since the inception of double-entry bookkeeping system in 1494.

Blockchain is a data structure that holds the transaction records with security, transparency and decentralization. It is a chain of immutable blocks and not controlled by a single authority. It is an append-only and distributed ledger technology that is operated by a peer-to-peer network mechanism that records and validates data by retroactively referencing a list of previous records using hash functions.

Blockchain's usage is not limited to Bitcoin only, but it is used in other applications as well. Ethereum, a framework that is considered the 2.0 of blockchain, is regularly leveraged for its ability to create smart contracts — a digital contract that's highly programmable and self-executes provided set terms and conditions have been met, thus resulting in a transaction. Besides blockchain's ability to automate transactions and verify information, we can safely define as valid (without the need for centralized approval), blockchain also has the ability to integrate into other technologies and software, which provides the biggest selling factor to its value.

All the confirmed and validated transaction blocks are linked and chained from the beginning of the chain to the most current block, hence the name blockchain. The blockchain thus acts as a single source of truth, and members in a blockchain network can view only those transactions that are relevant to them.

How Blockchain Works?

1. A blockchain is a chain of blocks that contain data or information.
2. Each block in a blockchain network stores some

information along with the hash of its previous block. A hash is a unique mathematical code which belongs to a specific block. If the information inside the block is modified, the hash of the block will be subject to modification too. The connection of blocks through unique hash keys is what makes blockchain secure.

3. While transactions take place on a blockchain, there are nodes on the network that validate these transactions. In Bitcoin blockchain, these nodes are called as miners and they use the concept of proof-of-work in order to process and validate transactions on the network. In order for a transaction to be valid, each block must refer to the hash of its preceding block. The transaction will take place only and only if the hash is correct. If a hacker tried to attack the network and change information of any specific block, the hash attached to the block will also get modified.
4. The breach will be detected, as the modified hash will not match with the original one. This ensures that the Blockchain is unalterable as if any change which is made to the chain of blocks will be reflected throughout the entire network and will be detected easily.

Types of Blockchains

Public Blockchain is a permissionless ledger and can be accessed by any and everyone. Anyone with access to the internet is eligible to download and access it. Moreover, one can also check the overall history of the blockchain along with making any transactions through it. Public blockchains usually reward their network participants for performing the mining process and maintaining the immutability of the ledger. i.e. Bitcoin Blockchain. Public blockchains allow communities worldwide to exchange information openly and securely. However, an obvious disadvantage of this type of blockchain is that it can be compromised if the rules around it are not executed strictly. Moreover, the rules decided and applied initially have very little scope of modification in the later stages.

Private Blockchain is the one which is shared only among the trusted participants. The overall control of the network is in the hands of the owners. Moreover, the rules of a private blockchain can be changed according to different levels of permissions, exposure, number of members, authorization etc. Private blockchains can run independently or can be integrated with other blockchains too. These are usually used by enterprises and organizations. Therefore, the level of trust required amongst the participants is higher in private blockchains.

Blockchain Features -The following features make the revolutionary technology of blockchain stand out and helps in achieving Supply Chain Goals.

- **Peer-to-Peer Network:** Blockchain uses P2P protocol

which allows all the network participants to hold an identical copy of transactions, enabling approval through a machine consensus. For example, if you wish to make any transaction from one part of the world to another, you can do that with blockchain all by yourself within a few seconds. Moreover, any interruptions or extra charges will not be deducted in the transfer.

- **Tamper-Proof:** Blockchains are considered tamper-proof as any change in even one single block can be detected and addressed smoothly. There are two key ways of detecting tampering namely, hashes and blocks. As described earlier, each hash function associated with a block is unique. You can consider it as a fingerprint of a block. Any change in the data will lead to a change in the hash function. Since the hash function of one block is linked to next block, in order for a hacker to make any changes, he/she will have to change hashes of all the blocks after that block which is quite difficult to do.
- **Immutable & Secure** — Because blockchain is appended only, this means data recorded on a ledger cannot be erased, changed or falsified once it's entered. This prevents unresolved disputes between trust-less parties and makes data secure so that it cannot be easily tampered with.
- **Live Tracking & Provenience of Assets** — Improve product tractability & provenance throughout the extended supply chain with Blockchain, information from the blockchain-based supply chain is secure, reliable and inclusive.
- **Decentralized** — Blockchain is self-regulated and doesn't rely on a central point of governance. Enterprises can rely on trust-less interactions knowing validation is required before finalizing various business transactions.
- **Automated** — Because consensus mechanisms are self-governed, and smart contracts follow the same principle, blockchain itself is capable of automating transactions that take place within supply chain processes.
- **Easy Integration with other Technologies** — Another notable feature of blockchain that appeals to supply chain enterprise systems is the ability to integrate into existing technologies. Blockchain as a working pair with technologies such as AI, Big Data, IoT devices, etc. can be enhanced which optimizes the operations required to complete processes through automation and securely storing retrievable data.

Applications of Blockchain in Supply Chain

- a. Global retailer Walmart uses blockchain to track sales of pork in China. Its system lets the company see where each piece of meat comes from, each processing and storage step in the supply chain, and the products' sell-by date. In the event of a product recall, the company can also see which batches are affected and who bought them.
- b. Maersk's use of blockchain is demonstrating that the administrative costs of shipping flowers from East Africa to the Netherlands can be drastically reduced.
- c. In international trade, blockchain is making it possible to process paperwork, transfer ownership, and pay

sellers and freight carriers in a matter of minutes. Wine is traced from the Napa Valley to China.

- d. Diamonds are monitored from South African mines to retail store shelves in order to eliminate the scourge of blood diamonds.
- e. Health care providers verify that pharmaceuticals have been kept at the proper temperatures throughout the shipping process.
- f. Automotive Suppliers Payment — Tomcar, Australia is using Blockchain for payment purpose to its suppliers located worldwide through Bitcoin. It leads to cost-saving by eliminating third party, reducing transaction time, no banking channel required etc.]
- g. Electric Power Micro-grids - Smart contracts are being used to redistribute excess power from solar panels. The Transactive Grid is an application running on blockchain to monitor and redistribute energy in a neighbourhood micro-grid. The program automates the buying and selling of green energy to save costs and pollution. The process uses the Ethereum blockchain platform, designed specifically for building and executing smart contracts.
- h. RFID tags for cartons or pallets store information on delivery location and date. Logistics partners run applications to look for these tags and bid for a delivery contract. The partner offering optimal price and service gets the business. A smart contract then tracks the status and final delivery performance.
- i. Blockchain and Internet of Things - Smart contracts to manage rentals of driverless cars. A smart contract could check for rental payments. If there has been no payment or the rental agreement reaches the end of its term, the smart contract could lock the car and tell it to drive itself back to the hire company's premises.

Summary

Blockchain is a new disruptive paradigm for many technologies that require a single source of truth. Whether it be Hyperledger, Ethereum, or another blockchain technology, all implementations require proper levels of processing, storage, networking, and security to work optimally. Blockchain can transform supply chains, industries, and ecosystems. Interestingly, even organisations like banks, that would appear to be losing out to the new technology, can see opportunities to exploit it in the streamlining of their operations.

Structured supply chain transformation is coming as a result of Industry 4.0 technologies including the Internet Of Things (IoT), Artificial Intelligence (AI), 3D printing and Augmented and Virtual Reality (AR/VR). Importantly, Blockchain is another emerging technology that ties together all of these pieces and makes possible the digital transformation of entire ecosystems.

Blockchain is becoming a standard in the business world, and it supports different players as they rethink enterprises, ecosystems, and economies. Leading companies use blockchain to build trust, transparency, and data synchronization across ecosystems — and to create new business models.

Thus, Blockchain will be next of Everything – whatever field it be.

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PHARMACEUTICAL SUPPLY CHAIN VULNERABILITIES: ROLE OF INFORMATION TECHNOLOGY

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Introduction : A supply chain is a set of processes, people, infrastructure, operating policies and agreements among different entities, whose objective is to transform the raw materials into finished goods and deliver to end customers, profitably. Modern supply chains are typically global and dynamic network arrangement of business entities that process the demand information upstream and coordinate product delivery downstream. Increased specialization and the drive towards efficiencies have resulted in burgeoning number of independent players across all supply chains necessitating the increasing need for integration across both strategic and operating levels. Additionally, pharmaceutical supply chains are vulnerable to a set of specific external forces acting on them. Goal of supply chain integration is to ensure smooth flow of product and information on one hand and plug the vulnerabilities on the other hand. Information Technology is the oil with which this integration machinery works. This paper examines the pharmaceutical supply chain vulnerabilities and role of Information Technology in enabling a better integration in light of these vulnerabilities.

Pharmaceutical Supply Chains : Pharmaceutical supply chains consist of the following entities:

1. **Product Development Organizations :** These are either specialized independent research organizations or in-house R&D departments of large pharmaceutical companies, whose focus is to develop new drugs for different therapeutic applications. New drug development process is long, arduous, costly, highly regulated and is ridden with uncertainties. A new drug development begins with evaluation of thousands of potential molecules to zero-in on one. It is not uncommon for this process to take 8 to 10 years before a successful launch and burn a couple of billions of dollars in the course.
2. **Active Pharmaceutical Ingredient (API) Manufacturers :** API (also known as bulk drug) is the main raw material used for making final drugs (also called formulations). API is essentially molecule that is produced using a series of chemical and physical processes. API manufacturing is a capital intensive, batch processing and quality sensitive task. Good Manufacturing Practices (GMP) and regulations govern the quality standards to be followed in API manufacturing. A typical batch processing cycle-time can run into days and a WIP of 30 to 60 days is common. Most of API manufacturers are situated in India and China. Often, API manufacturers also outsource

part of the production processes to Intermediates and may also have downstream formulation plants.

3. **Secondary / Finished Dosage / Formulation Manufacturers :** Formulation manufacturers (also known as secondary or finished dosage manufacturers) are involved in producing the ready-to-consume form drugs in tablets, capsules, injection vials etc. from APIs and other pharmaceutically inert binding material. These are the global majors of the pharmaceutical industry. Formulation plants are typically smaller in size, closer to markets and produce smaller batch sizes in comparison to API manufacturers. Formulations consist of drugs within (branded) and outside (generic) patent expiry date. While Formulations manufacturers typically focus on branded drugs, API manufacturers contend to move up the value chain by developing the generic formulations for drugs approaching patent expiry. Formulation manufacturing may be outsourced or handled in-house. Similar quality norms prevail in Formulations manufacturing processes as in API manufacturing.
4. **Transportation, Warehousing and Distribution :** The distribution of Finished Dosages to the patients happens through a multitude of channels such as company's own warehouses, wholesalers, 3rd party distributors, large pharmacy retailers, Group Purchase Organizations, direct-to-customers (typically large healthcare providers or NGO organizations), government operated public healthcare organizations etc., to name a few. Global transportation of bulk drugs is typically through a combination of ocean and over the road networks. Formulations are transported using air and over the road carriers. Transportation and warehousing of different drugs requires controlled temperature (ambient: 20~25°C, refrigerated: 2~8°C, frozen: sub-zero) conditions and specialized end-to-end cold chain infrastructure. Dispensation of drugs to patients happens through the end-points of the above mentioned distribution nodes either on prescription or over the counter depending on the type of drug.

Pharmaceutical Supply Chain Vulnerabilities : In comparison to the traditional consumer durables or FMCG supply chains, pharmaceutical supply chains are quite complex. Following vulnerabilities contribute to this complexity:

1. **Temperature excursions :** Any temperature excursions of the drug in the lengthy supply chain

may render the entire batch useless at best and out-right dangerous at worst. There are pockets of supply chains such as transportation, transshipment and loading & unloading which are highly vulnerable for excursions. Management of interfaces between different supply chain partners with a focus on such excursions is crucial for the overall supply chain success.

2. **Rigid Production Processes :** Usage of conventional batch processing is no longer suitable for the current dynamic environment. Make-to-order and continuous production are the order of the day as (a) there is a proliferation of specific drugs for specific conditions and (b) nobody in the supply chain wants to keep excess inventory of potentially non-moving drugs. Advanced Manufacturing Technologies that support continuous production are now already available. It is a moot question as to how many of the pharmaceutical supply chains are ready to radically overhaul their production processes.
3. **Multitude of stakeholders :** Pharmaceutical supply chains are constantly subject to nudges and forces from a variety of stakeholders such as public-at-large, regulatory bodies, insurance companies, Group Purchase Organizations, NGOs, medical device manufacturers, healthcare providers, camps promoting alternate medicines / treatment methods etc., to name a few. Given the sensitivity of outcomes in terms of the physical well-being of patients, it is imperative that the pharmaceutical supply chains cannot afford to ignore the voice of any of these stakeholders.
4. **Expansion of the coverage :** Measures by national governments to increase the insurance coverage for poorer sections, increased life expectancy, decreased infant mortality, emergence of life-style related diseases in affluent countries, out-break of epidemics in developing countries etc., are putting immense pressure on pharmaceutical supply chains to come up with custom supply chain designs that are suitable for individual market segments.
5. **Increasing accountability :** The complete traceability of a drug's batch is a key requirement for pharmaceutical supply chains, in order to assign accountability to the correct entity. Even the unknown or unforeseeable side-effects missed during drug development and approval can result in huge implications for a pharmaceutical supply chain.
6. **Sustainability :** Reverse logistics to collect and safely dispose the expired drugs, adhering to mandatory affluent treatment, hazardous material disposal by the API and formulations manufacturers are the key sustainability requirements of pharmaceutical supply chains.
7. **Radical Innovations :** New developments in Biologics, Nucleic acids, cell therapy, regenerative medicine, implantables and bioelectronics have the potential to totally alter the way new drugs are

developed and administered to patients. This may mean a complete overhaul of current pharmaceutical supply chains to remain relevant in the new reality.

8. **Counterfeits :** The menace of Counterfeit drugs is rampant across the globe. It is important for the pharmaceutical supply chains to sensitize pharma retailers and customers on the perils of these counterfeit drugs and also put sufficient security measures in their supply chains to detect and prevent infiltration of the counterfeits.

Information Technology & Supply Chain Integration : Integration of supply chains involves shared strategic objectives, transparency and timeliness of information sharing, creation of joint planning, feedback & performance review mechanisms, institutionalizing flexibility of operations and undertaking continuous improvements projects together by different supply chain partners. Integration can be achieved in different degrees depending on the length and trust in the relationship. Lowest level of integration is at the operational planning and execution and the highest level is when the supply chain partners share the strategic objectives and align their commercial relationship to suit these objectives. Information Technology is a foundation on which supply chain integration can be realized among the supply chain partners. The following section briefly describes about a few existing and emergent technologies and how pharmaceutical supply chains can leverage these technologies to achieve integration.

Supply Chain Management Electronic Data Interchange (EDI) : Real-time information on plans, reports, transactions and alerts can be exchanged between the enterprise systems of partners via supply chain electronic data interchange (EDI). Information documents such as purchase orders, shipment notices, invoices etc., are pre-coded and standardized in EDI framework. Implementation of EDI is known to reduce the business cycle times and improve data quality.

To illustrate the point, a specialty pharmaceutical company offering consumer healthcare & prescription products has been able to achieve same day dispatches to its trading partners such as McKesson, Cardinal Health, Walmart, Target and CVS. ProcessOne has helped this company automate the order fulfillment process data transmission through P1 EDI implementation. Purchase orders (at customers) trigger Sales Order generation (at the company HO), which in turn raise Advance Shipment Notice (at the Company Warehouse) followed by Invoice generation (at the company HO). These documents are electronically transmitted to the relevant trading partner with no manual intervention. This was a huge improvement compared to 2 or 3 day delay in dispatches, manual errors and high cost of fulfillment process.

Cloud Computing: Cloud based SCM solutions promise rapid scalability, immediate deployment and access from anywhere. Pharmaceutical supply chain partners, especially the ones without existing in-house enterprise systems could consider this solution to be digitally visible and integrate with the rest of the supply chain.

A few use cases for cloud in pharma industry identified by IDC2 and Ponemon Institute are: locating and managing subject patients in a certain area for clinical trials, access to product identifier database for pharma shipments by various heterogeneous stakeholders simultaneously and search virtual chemical libraries to identify potential molecules for future developments.

Industry 4.0 : Industry 4.0 collectively refers to a cyber-physical setup in which all the connected systems communicate with each other and manage decentralized and localized planning and execution. Key building blocks of Industry 4.0 are Advanced Robotics, Additive Manufacturing, Augmented Reality, Simulation, Horizontal & Vertical Integration, Industrial Internet and Cybersecurity. Pharmaceutical supply chains can use Industry 4.0 in production and logistics planning and controlling. Automated batch level tracking and control within the plant and pallet level tracking and control during transit is possible by using suitable sensors. Simulations can be used to optimize the production across the supply chain without having to incur costly set-ups.

According to a report by Frost and Sullivan, ApotexPharmachem3, a Canadian pharmaceutical manufacturer has implemented IIoT concepts such as autonomous vehicles, RFID tracking and smart sterilization that helped the company achieve real-time view of the plant operations, improve efficiency and productivity and thereby increase its capacity.

Block Chain : A block chain is defined as an open, distributed ledger that can record transactions between two parties efficiently and in a verifiable and permanent way. Thus the transactions recorded in block chains are immutable and the updates are traceable. By having the sensors record details such as chemical composition, temperature, package open status etc., into a block chain directly, everybody in the supply chain is aware of the prior transactions that have occurred on their shipments.

Merck4 has developed a PoC (Proof of Concept) Blockchain application in partnership with SAP to ensure authenticity of the returned drugs. This mobile application keeps track of the item number, a serial number, a batch number, and an expiration date every time the shipment changes hands in addition to geographically tracing the shipment, making it virtually impossible for the counterfeit drug to enter the supply chain.

Big Data & Analytics : Big Data refers to those IT applications that can collect, preprocess and generate learning / insights from this data. Typically sources of big data are social media platforms, company & other related websites and a hoard of sensors deployed across the supply chain. Analytics is of three kinds, namely descriptive, predictive and prescriptive. Pharmaceutical supply chains can find immense value in developing Big Data & Analytics capabilities in areas such as drug development (shortlisting molecules), impact of different local events on drug demand, quickly respond to reported drug side-effects etc.,

Merck5 had analyzed its production data of 255 batches over last 10 years that was spread over 16 databases

pertaining to one vaccine, performed over 15 billion calculations using Big Data concepts with a help of an analytics firm, Hortonworks to identify variable levels (from among hundreds of variables) of batches with highest yields. Using the insights, the company had significantly improved the yields and reduced the cost of production of this vaccine and later by applying same principles, other vaccines as well.

Conclusion : In conclusion, we summarize the efficacy of various Information Technology options in achieving integration and in addressing vulnerabilities of pharmaceutical supply chains as follows, with a caveat that IT is just a tool and it is the managers that must make it work:

Vulnerability / IT Solutions	EDI	Cloud	Industry 4.0	Block Chain	Big Data & Analytics
Temperature excursions			Y	Y	
Rigid Production Processes			Y6		
Multitude of stakeholders	Y	Y		Y	Y
Expansion of the coverage	Y	Y	Y		Y
Increasing accountability	Y	Y	Y	Y	
Sustainability			Y7		Y
Radical Innovations				Y8	Y
Counterfeits				Y9	

The above analysis indicates that whilst for some vulnerabilities (viz., Multitude of stakeholders, Expansion of coverage etc.) a combination of IT solutions are relevant for best results whereas for the vulnerability, Radical Innovations the existing IT solutions are inadequate in their current state.

(Footnotes)

1<http://www.processonesolutions.com/news/2017/6/15/lup16dk9ly735bse7z1irwvffvt1w>

2<https://www.healthcareitnews.com/news/top-pharma-use-cases-cloud>

3<https://www2.frost.com/frost-perspectives/towards-pharma-40digitization-pharma-manufacturing/>

4<https://hackernoon.com/top-5-use-cases-of-blockchain-in-pharma-and-healthcare-that-you-should-know-about-77ccdd76369b>

5 <https://hortonworks.com/solutions/pharmaceuticals/>

6 Advanced Manufacturing Methods are considered part of Industry 4.0 portfolio

7 Effluents emission can be simulated using Industry 4.0 and Analytics suite and appropriate managerial decisions be taken

8 Once the company has built Radical Innovation capability, Block Chain, Big Data & Analytics can be useful in integration

9 Counterfeits infiltrating into the legitimate pharmaceutical supply chains can be detected and blocked using block chains

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STOCK DIGITIZATION FOR EFFICIENT AND EFFECTIVE SPARE PART INVENTORY CONTROL: A CASE STUDY APPROACH

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1 . Introduction : The very survival and growth of a manufacturing organization, in the present highly competitive global environment depends on the fact that the Production of customer demanded items has to be carried out as per the Uninterrupted Production Schedule. This can be fulfilled only when production Equipment (and facilities) are made **Available with Full Functional Capability** for the predetermined time schedule. This state of the Equipment which is crucial in meeting the Production Schedule can be measured in terms of Operational Availability – **AO**, which is “The Probability that, when used under stated conditions, a system will operate satisfactorily at any time. Includes Standby Time and Administrative and Logistics Delay Time” (Douglas K. Orsburn’s). This is the Realistic Measure of Availability as it is integrated with Manufacturing Environment and its Constraints and Surroundings. Hence it is the most suitable form of Availability in this context and it can be measured as given below:

$$AO = \frac{OT+ST}{OT+ST+TPMT+TCMT+ALDT} \text{ Equation - 1 (Douglas K.Orsburn 's).}$$

[Legend: . OT -> Operating Time [Equipment in Use]. TPMT -> Total Preventive [scheduled] Maintenance Time. TCMT -> Total Corrective [unscheduled] Maintenance Time. ST -> Standby Time [but assumed to be Operable]. ALDT -> Administrative and Logistics Downtime spent waiting for parts, administrative processing, technicians or transportation [no maintenance time]. Alternatively it can be said that “The average calendar time that a system is not available for use in specified periods (DH Stamatis a\$). All Metrics and Elements of Time are measured per Specified Time Period.]

So it is evident from equation – 1, that to get a higher value of Operational Availability – **AO**, the values of Denominator factors have to be minimized. **ALDT** [Administrative and Logistics Downtime spent: waiting for parts, administrative processing, etc.] is a good candidate for minimization as it can be done with better Management techniques and practices. **Unavailability of Genuine Spare Part** adversely affects **ALDT** directly. In other words, to minimize **ALDT**, an important element, “**Downtime Spent Waiting for Parts**” has to be eliminated or minimized as it is mainly within the control of Materials department. Also generally it is the longest time consuming element of **ALDT**. This article shows how **Stock Digitization** can

accomplish elimination/minimization of “Downtime Spent Waiting for Parts” while analyzing a Case Study.

1.1. Spare Part Inventory Control : Spare Part Inventory Control is a coordinating function responsible for Planning and Controlling Spare Parts flow in an industrial organization. “Inventory Control is the Science-based art of Controlling the amount of stock held, in various forms, within a business to meet economically the demands placed upon that business” (Dr. CD Lewis b\$).

1.2. Objective of Spare Part Inventory Control : The objective of Spare Part Inventory Control is to ensure **Spare Part Availability** as and when required for replacing the damaged Parts of the equipment in service. Spare Part Availability is defined as the situation wherein the **Needed Genuine Spare Part** is available **On Site** for ready replacement **When Needed** in the **Required Quantity**. This objective can be achieved by providing answers to the below given six questions:

- 1] What To Stock?
- 2] How Much To Order Initially?
- 3] Where To Stock?
- 4] When To Re-Order?
- 5] How Much To Re-Order? and
- 6] What is the Target Service Level.

In the Normal Operations stage of Spare Part Inventory, the Re-ordering process is initiated by an universally accepted **trigger** namely **ROL (Re-Order Level)**. This becomes imperative to have absolute matching of **Digital Stock Value (from computer system) with Physical Stock Count (from Stock Check)** for timely and accurate triggering at **ROL** for attaining the objective of Spare Part Availability, especially in the case of **Insurance and Critical Spare Parts**. Spare Part Availability is the foremost condition to obtain the maximum value of Operational Availability of a production equipment, on which the Production Schedule is built.

2. Repair and Maintenance : Spare Parts needed to maintain the Production Equipment and Facility in full functional capability to have production output as per schedule. If genuine Spare Part is not available when needed, replacement of damaged part will not happen and in turn the scheduled Production will be affected adversely. At this juncture, it is only logical to

understand the terms Repair and Maintenance.

Repair: “Restore (something damaged, faulty, or worn) to a good condition” is what Oxford dictionary says. John E. Day, Jr says “Repair: To restore by replacing a part or putting together what is torn or broken: fix, rejuvenate, etc” (Richard D. Palmer c\$). Another author Douglas K. Orsburn `\$, describes Repair as “Restoration or Replacement of parts or components of facilities or equipment as necessary to return the facility or equipment to efficient operating condition”. Joseph D. Patton, Jr d\$ is of opinion that Repair is “The restoration or replacement of components of facilities or equipment as necessitated by wear, tear, damage, or failure. To return the facility or equipment to efficient operating condition”.

Maintenance: The Oxford dictionary gives the meaning of Maintenance as “The process of preserving a condition or situation or the state of being preserved”. Another definition by Joseph D. Patton, Jr d\$ is “The function of keeping items or equipment in or restoring them to, serviceable condition. It includes servicing, test, inspection, adjustment / alignment, removal, replacement, reinstallation, troubleshooting, calibration, condition determination, repair, modification, overhaul, rebuilding, and reclamation. Maintenance includes both corrective and preventive activities”. According to John E. Day, Jr, Maintenance is: The act of maintaining. To keep in an existing state: preserve from failure or decline, protect, etc” (Richard D. Palmer c\$). Then Douglas K. Orsburn`\$ states that Maintenance is the “Function of keeping items or equipment in, or restoring them to, serviceable condition”.

On analyzing the above definitions of Repair and Maintenance, it can be seen that Repair is Reactive and Maintenance is Proactive in nature. And also there exists some conceptual overlapping and hence it can be presumed that Maintenance includes Repair also.

There are two types of Maintenance namely Reactive maintenance and Proactive maintenance. Richard D. Palmer c\$ in his famous book titled “Maintenance Planning and Scheduling Handbook” states that

“Reactive maintenance is:

1. When equipment is actually broken down or fails to operate properly.
2. Priority-0 jobs are defined as emergency and so they are reactive.
3. Priority-1 jobs are defined as urgent and so they are reactive.

Proactive maintenance is:

1. Work done to prevent equipment from failing.
2. Any preventive maintenance (PM) job.
3. Work orders initiated by the predictive maintenance group when the need is not otherwise

readily apparent.

4. Project work to upgrade equipment”.

Thus both these types of Maintenance require different planning processes. Reactive maintenance jobs are to be carried out immediately as equipment has already been broken down and hence it is quite absurd to wait for planning. However the data related to this type of jobs have to be captured after the completion and analyzed.

Proactive maintenance jobs can be and should be planned and scheduled. “The objective of proactive maintenance is to stay involved with the equipment to prevent decline or loss of capacity. Planning and scheduling a sufficient amount of proactive work reduces the number of urgent problems and breakdowns” (Richard D. Palmer c\$). This is the reason that many an industrial organizations have full-fledged department to carry out these functions.

Efficient and effective maintenance reduces overall cost of production because production capacity will be available when needed. This scenario is created by good maintenance planning and scheduling. Thus the planning department increases the ability of maintenance department to complete the maintenance work orders on time. This is because of the fact that a well planned and scheduled MWO (Maintenance Work Order) will be assigned to the crew for immediate execution, only after all instructions, required parts, permissions for the custody of equipment, safety clearances, tools, equipment, and other arrangements are made ready. So the crew can start the job as scheduled and there will be only **minimum waiting time** for any coordinated activities and this in turn will increase the wrench time.

2.1. Maintenance Planning : Maintenance Planning is about organizing the jobs. “That is, who will do the work, when will it be done, how will it be done, and what tools and **spares** will be needed” (Philip Slater e\$). This is a very distinct effort. Michael V. Brown f\$ describes it further as “Planning is the allocation of needed resources, and the sequence in which they are needed, to allow an essential activity to be performed **in the shortest time or at the least cost**”. In other words, this definition emphasizes the fact that “the cost of downtime can be reduced with a good plan” by reducing the time the equipment being out of service. In effect, unnecessary job delays are reduced by advance preparation.

Planning of MWO mandatorily requires the Identification of all the needed Resources and their Availability to complete the job on time. The resources include:

- Workforce (Skilled, Unskilled)
- Materials (Spare Parts, Consumables, Hand Tools, Machine Tools, etc.)
- Support Equipment (Cranes, Fork Lift, Truck, etc.)

- Contracted Services (Manufacturers, Service Providers, etc.)
- Time (Equipment Availability, Production Schedule, etc.)
- Procurement Information (Materials)
- Contracts Information (Services) etc. (Michael V. Brownf\$)

Planning of MWO is to be started when the need for Maintenance Work is identified based on Maintenance Requests from Operations (breakdowns) and Predictive Maintenance group (Condition based); data about Preventive Maintenance in Equipment Manuals (Calendar and Meter based), Fixed-Interval based Maintenances and Overhauls (Equipment Manuals) etc. Planning group has to initiate relevant procurement actions (Requesting, Expediting etc.) for materials and services based on the availability of items.

2.2. Maintenance Scheduling : Even though Maintenance Scheduling is a distinct function from maintenance planning, in reality it is closely related to planning. At this juncture, it is quite apt to read Michael V. Brown'sf\$ definition: "Scheduling is the assignment of many planned jobs into a definite period of time in order to optimize the use of the resources, within their constraints". Effectiveness of Maintenance Scheduling depends on that of Planning and Job Priority System.

The **Job Priority** is to be fixed by striking a balance between the Criticality of the job and the Resource Constraints. No maintenance resource is unlimited in any organization. Hence Resource Optimization is a must for Job Prioritization. The resource constraints according to Michael V. Brown f\$ are:

- Fixed amount of workforce
- Fixed number of personnel with special skills
- Working Space constraint (OSHA regulations – no work can occur under the lift path)
- Physical properties of equipment (work can start only after proper preparation of equipment and machinery for maintenance work)
- Government Rules and Regulations
- Money (Budget) etc.

The main **prerequisite** for Maintenance Scheduling, is ensuring the availability of all resources especially **Spare Parts** before final scheduling itself. If resources are not available, the very objective of Maintenance Planning – to complete the jobs in the shortest possible time at optimum cost – will be lost. And this is the primary responsibility of the Maintenance Planners.

3. Importance of Spare Part Availability: A Case Study

This happened in a large Petro-Chemical Industrial organization. This company has installed several Gas Turbines to generate electrical power for both captive consumption as well as for supplying to the national grid. In a particular Plant location, there are four turbines

working at full load rating to generate power for captive consumption. One turbine of this plant was due for Major Overhauling in the current year. When a turbine is taken for Fixed-interval Overhauling (O/H), the practice is to make arrangement to obtain power from national grid.

3.1. Maintenance Work Order (MWO) : In the beginning of the year (January) itself, the Maintenance Planning and Scheduling (MPS) section of the Maintenance department initiated actions for this Fixed-interval O/H. Thus they created the MWO for this job as the primary step. As it is a standard job that had been carried out couple of times in the past, required Technical documents were readily available, including the Repair Bill of Materials (R-BoM) related to the O/H.

3.2. Material Request : A Material List was prepared based on the R-BoM of the O/H job and checked the stock status of the required MRO materials (Maintenance, Repair and Operations support materials - Philip Slater e\$) in the ERP System. A Material Request (MR) was prepared for the materials as per the R-BoM of the job and sent to W/H (Warehouse) for reserving the quantities of materials with Required on Site Date (RoS - Date). W/H informed MPS Section about the reservation of quantities of materials and MPS verified the reservation status in ERP System.

In the case of materials having inadequate stock (Nil stock or insufficient stock), Procurement Actions (Expediting, raising new Purchase Requisitions (PR), requesting for Purchase Order (PO) Quantity Amendments etc.) were originated by MPS.

3.3. Notice to Operations Department : A notice was issued to the Operations Department informing the expected job duration and Date of commencement of O/H job based on Lead Time (LT) data of materials on Order and LTs of materials to be procured. This was done to modify / update the Production schedule as required to facilitate the O/H job. And also for arranging Power requirement from national grid.

3.4. Scheduling of Maintenance Work Order (MWO) : When all the materials including the newly ordered and expedited ones, with required quantities were received, MPS section was notified by W/H. Then MPS section arranged the needed Workforce, Support Equipment, Contracted Services etc. and scheduled the MWO.

3.5. The Job Execution : After obtaining all the needed Clearances and Permissions, Maintenance department took custody of the particular Turbine and started the O/H work. During this O/H, it had been decided to replace the Secondary Nozzle which had been categorized as an Insurance Item. Its average consumption was about 1 number in 7 to 8 years. This Make-To-Order item costs more than half a million dollars with a Lead Time of 12 months. To bring this item, Maintenance Engineer (ME) arranged personnel

and vehicle etc. and reached the W/H with the required Material Request.

3.6. The Disappearance of the Item : On the arrival of Maintenance Engineer, Senior Warehouse Supervisor (WS) along with W/H staff went to the location shown in ERP System, to arrange for moving the item to the Shipping Pickup area. **Then to the surprise of all, they couldn't locate the item at all.** Everybody got bewildered. The Stores Manager, his Supervisors and all his staff started checking the whole area of the W/H. They went through the copies of all documents – Goods Receipt Note (GRN), Material Rejection Report (MRR), Material Request (MR), Material Return Note (MRN), Stock Check Report (SCR), Disposal Proposal (DP), Delivery Challan (DC), etc. Management issued an immediate enquiry on this sensitive issue. A few days of checking the documents and the enquiries with related departments (mainly Maintenance department) did not reveal the reason for the disappearance of the item from W/H. Receipt records were available and a couple of staff vouched for receiving the item, but no trace of issue of the item could be located from the records kept in the W/H. According to some staff members' memory, the item was kept on the floor of the main W/H building, in a wooden box measuring about 12 to 14 feet long by 3ft wide by about 1.5 ft deep. They guessed the weight to be about 80 to 100 Kg. So it is very clear that to move the item from its storage location recorded in ERP System, to the shipping pickup area, EOT crane and forklift are a must. However there is no record of issue obtained from searching the documents kept in W/H.

3.7. The End Result : At the end, the Management didn't get any valid evidence of issue of the item and the enquiry with Maintenance department also didn't give any conclusive evidence. Thus it turned out to be a mysterious disappearance ultimately. This led to the extension of time required for the O/H of the turbine.

3.8. Arranging the Spare Part : The Management contacted the OEM (Original Equipment Manufacturer), for obtaining the Item on an urgent basis. The OEM replied that as a special case, it could supply the item in six (6) months at 15% extra cost. Another option pointed out by OEM was to supply the item by diverting a piece of the item being manufactured for another user in a month's time at an extra cost of 40%. And the Management, after conducting the economic evaluation, opted for the second possibility. But this doubled the duration of O/H from six (6) weeks to twelve (12) weeks. In fact, the omission to check the physical stock of a Spare Part that too an Insurance Spare, before Planning and Scheduling a major O/H of the turbine, by both MPS and W/H led to heavy loss to the organization.

4. Analysis of the Case Study: The shortcomings : After arranging for the O/H, the Management wanted to do an analysis and review of the incident of Non-availability

of Spare Part when needed. With the aim of identifying inadequacies and recommending measures for their prevention, a Stock Record Review Committee (Committee) was constituted with Managers and Senior Supervisors of Maintenance and Warehouse departments as members and an external Consultant as Subject Matter Expert (SME). After studying the situations and practices followed in Maintenance and Warehouse departments, the committee listed the shortcomings in section 4.0 and recommended solutions to prevent the occurrences of the present deficiencies in section 5.0.

4.1. Omission of Tracking of Material Movement in Warehouse : At present the data of transactions related to Receiving, Rejecting, Issuing, Returning etc. of Items are entered into ERP System manually. In other words, the accuracy and correctness of the movement of Items entered into ERP System **depends solely on the diligence** of the staff involved. And now it is established beyond doubt that manual tracking of movement of Items in the W/H was inadequate and hence the **Insurance spare** was missing when overhauling was started.

4.2. Omission of Insurance Spares from the List of Stock Check Item List (SCIL) : The Committee was analysing the situation of Non-availability of an Insurance Item. When the Stock Check procedure was studied, it was found that the Item in question did not appear in the Stock Check Item List (SCIL) at all, even though the Item was received 3 (three) years ago. This was because of the reason that Items for Stock Check used to be identified as per the Classical Annual Usage Value based A-B-C Classification only. In this report Items will appear only if they are issued in the current year.

4.3. Inadequate Frequency of Stock Check Of Insurance and Critical (Vital) Items : The Frequency of checking the physical stock of A items was fixed as once in three months. For B Items, it was once in six months. All other Items used to be checked, once in a year. The Stock Checking was done by the particular staff only. There was no counter-checking by the Warehouse Supervisor for verification of stock, even in the case of A Items.

4.4. Unwanted Content in Stock Check Item List : The Stock Check Item List, contains the Quantity On Hand (QOH) as of the time of printing the Item List by ERP System. The presence of QOH, in the list is a tempting force for skipping of actual counting of QOH, at least for some items.

4.5. Wrong Line of Reporting of Stock Check Staff : There is a separate staff assigned to Stock Checking of Items. This staff is reporting to the Warehouse Manager. The Stock Check Report is submitted to Warehouse Manager only. The Supply Chain Manager receives the Stock Check Report only after seen and modified by the Warehouse Manager. This actually invalidated the very purpose of Stock Checking.

4.6. Absence of Checking of Physical Quantity while Reserving Items as per Material Requests : This is a very serious dereliction of duty, only next to omission of tracking of Item Movement in the W/H. “Spare Parts are the bread and butter components of conducting maintenance”. Had any of the staff from W/H department **checked the Item before Reserving**, or anybody from Maintenance checked **after Reserving the Items**, the adverse scenario of Non-availability of Spare Part when Needed wouldn’t have occurred at all.

5. Recommendations to Prevent the Non-availability of Spare Part When Needed.

The committee’s recommendations are listed in the ensuing sub sections. The recommendations are basically for improving the accuracy, correctness, efficiency, timeliness and visibility of stock data across the organization. For this purpose the committee recommended **Digitization** of Stock Data plus modifications to the practices followed in the W/H. This is because of the fact that for achieving efficient and effective business result, it is a prerequisite to have the appropriate Business Process in place, prior to implementing Digitization or any Automation.

5.1. Digitization : For Digitization and Digitalization, Oxford Dictionary gives one and the same definition as “the conversion of text, pictures, or sound into a digital form that can be processed by a computer”. Businessdictionary.com defines digitization as “Conversion of analog information in any form (text, photographs, voice, etc.) to digital form with suitable electronic devices (such as a scanner or specialized computer chips) so that the information can be processed, stored, and transmitted through digital circuits, equipment, and networks”.

So basically, digitization is the process of creating digital data from physical analogue originals using electronic equipment such as Scanner, Camera or other electronic devices, for storing in the form of a computer database and to process the data to generate valuable business information.

5.2. Tracking of Movement of Insurance and Critical (Vital) Items in Warehouse with RFID : Spare Parts of the categories of Insurance and Critical (Vital) Items are highly essential for making the Production Equipment and Facilities available for scheduled production. Non-availability of these Items when needed, will cause exorbitant losses in production quantity as well as in acquiring the spare parts as is evident in the case study described above. To prevent such unwanted scenarios, it is a must to have visibility of stock status of these items with accuracy and timeliness across the organization so as to originate replenishment actions as well as maintenance planning and scheduling initiatives, on time. In this context the case study threw light on the fact that manual tracking of movement of Items in the W/H is inadequate, as errors can occur in

the form of:

- Inconsistent data
- Inaccuracy / Error in data entered
- o Wrong Transaction Type
- o Wrong Location Code
- o Wrong Unit of Measure
- o Wrong Quantity etc.
- Typographical errors
- Duplication of data
- Delay in data entry
- Omission of data etc.

Hence the Committee recommended to go for a fully automated and highly accurate Smart Asset Tracking system using RFID, without human intervention to enable Spare Part Inventory Control, for Insurance and Critical Items. In other words, this organization essentially needs an automatic Smart Asset Tracking and Inventory Management System (SATIMS) to provide accurate and timely information across the organization to facilitate data driven decision making to survive in the highly competitive global environment. The review of the case study and the critique of present procedures and prevalent practices by the Committee, emphasised the fact that “Data quality and governance has always been important to the Supply Chain function, but today it is critical”, as put forward by Robert Handfield g\$. Hence the committee endorsed **Active RFID (Radio Frequency Identification)** based **digitization** of tracking of movement and disappearance of Items in the W/H plus a couple of modifications to the procedures and practices followed by Maintenance and W/H departments. The Smart Asset Tracking and Inventory Management System (SATIMS) consists of Active RFID Tag, RFID Reader device and back end IT System. In this article, RFID stands for Active RFID or SATIMS depending on the situation.

5.2.1. RFID Technology – an Introduction : RFID technology employs radio frequency waves to identify objects. It can read and capture information stored on a tag attached to an object. This is a touch-free technology (contactless interrogation method for identification of objects) and it can offer higher accuracy in captured data. Real-time inventory tracking can be done quickly by Active RFID. “(Active)RFID tags monitor inventory on shelves and in transit coordinating with current stock level for automatic order replenishment” (Nada R. Sanders h\$). With the use of RFID, “More reliable and up-to-date information can also strengthen demand planning capabilities, potentially reducing out-of-stock and overstock situations with multiple options in procurement” (Digitization in Procurement and Supply – CIPS and University of Melbourne i\$). Reduction in error and rework motivates implementation of RFID technology. Another motivating factor for RFID implementation is misalignment avoidance with respect to Parts, Status, Position, Time etc. (Marcos Esposito et al. j\$).

5.2.2. Advantages of Active RFID : RFID captures physical flows of objects to give much better visibility of all assets including Items in W/H. Manufacturers place tag on the finished Items with required information as requested by customer. This makes it possible to have complete traceability of the Items. The advantages of RFID are:

- No direct line of sight is required for reading the RFID tag
- Metals and Liquids can block the reading. This problem can be overcome by installing multiple readers / interrogators for reading the tags
- Multiple parallel reads possible
- Individual Items can be identified
- It has Read / Write capability

In addition to the above advantages, RFID based digitization:

- Increases Asset Part Availability and
- Decreases Obsolete Inventory.

5.2.3. Active RFID System for Smart Asset Tracking and Inventory Management System (SATIMS) : RFID tag contains an electronic radio transmitter, an antenna and a tiny battery. The tag can be stuck to any surface. Each RFID tag has a Unique Identification Number (UIN) and sends out a radio signal carrying the UIN. The RFID reader/ scanner, extracts UIN of every tag in its range and updates to a database. Various software components working in unison extract and process information, including UIN, from RFID tags to form an inventory management solution. In a W/H, RFID readers are placed inside warehouses, transport vehicles and strategic points such as every entry and exit gates, interconnecting them. This interconnection records all the movements of Items. Data captured by the various readers in parallel are processed by the host computer before sending it to the central database storage for further processing if needed, to have immediate on-line visibility of Stock Status across the Organization.

RFID supports two way of communication so that tags and the reader work in liaison. In RFID based ATIM solution, each tag is authorized when it enters the W/H. The authorization tells the solution that this tag is now a part of the inventory and must be tracked at each level. Locators installed in Racks / Shelves or in Specified areas work in conjunction with active RFID Readers to report the precise Rack or Room location of the Active RFID – tagged asset. RFID emits signal every 30 seconds. This property generates fully automated immediate notifications of Stock Data with very high accuracy as Items move around or disappear, with no human involvement at all. These notifications are captured by SATIM system and stored in the database and processed to provide Stock Status visibility across organization. This in turn drives Data Driven Decisions to ensure Spare Part Availability when needed. This proves the rightness of Committee's recommendation.

5.2.4. Characteristics of Smart Asset Tracking and Inventory Management System (SATIMS)

Active RFID is superior to Passive RFID and Barcodes. Active RFID based SATIMS's characteristics are listed below:

- Reading Capability : Ability to Read, Write, Modify and Update.
- Reading Capacity : Capable of reading multiple tags simultaneously (> 100 tags).
- Line of Sight : No need to be in straight line between RFID and Reader.
- Human Power : Once System is commissioned, completely automated.
- Data Security : Difficult to Replicate. Data / Information stored highly Secure.
- Triggering : Capable to Trigger Events.
- Durability : High Durability. Can Read even in very harsh environment.

The qualities of Active RFID makes it as the automatic choice for the foundation stone of Smart Asset Tracking and Inventory Management System (SATIMS).

5.3. Omission of Insurance and Vital Spares from the List of Stock Check Item List

The present practice of preparing the Stock Check Item List (SCIL), is as per the Classical Annual Usage Value based A-B-C Classification. And it is wrong because majority of Insurance and Critical (Vital) items will never be moving in all the years and hence not checked in all the years at all. This is quite improper as it is a must to make the Stock Status of Insurance and Critical (Vital) items visible to the stake holders namely, Maintenance and Materials departments for taking appropriate actions immediately.

SCIL has to be prepared, taking into considerations of five classifications of Items, namely: Criticality (= I/V/E/D), Annual Usage Value (= A/B/C), Unit Cost (= H/M/L), Stock Value (= X/Y/Z) and Yearly Movement (= F/S/N). All the five classifications have to be done for all the items. Stock Check is to be done as explained below:

1. Group – 1: If an Item has Criticality = "I" or "V", its Stock On Hand has to be checked every month. Checking of Items with Criticality = "I" should be jointly done by Stock Check Staff and Warehouse Supervisor or his Representative.
2. Group – 2: For Items not included in 1: If an Item has Annual Usage Value = "A" or Unit Cost = "H" or Stock Value = "X" or Yearly Movement = "F", its Stock On Hand has to be checked once in every three (3) months.

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3. Group – 3: All remaining Items' Stock On Hand has to be checked once in a year.

Legend(Item Classifications): I à Insurance, V à Vital, E à Essential, D à Desirable, A à High Annual Usage Value, B à Medium Annual Usage Value, C à Low Annual Usage Value, H à High Unit Cost, M à Medium Unit Cost, L à Low Unit Cost, X à High Stock Value, Y à Medium Stock Value, Z à Low Stock Value, F à Fast Moving, S à Slow Moving, N à Non-Moving.

5.4. Unwanted Content in Stock Check Item List : The present Stock Check Item List contains the QOH (Quantity On Hand or Stock On Hand), as of the time and date of printing the list. The QOH information in SCIL is a tempting force for skipping of actual counting of QOH, at least for items having large quantity. This should be avoided and the W/H Supervisor should make sure, that Items having large QOH are counted properly. Inventory accuracy is highly important for Group – 1 Items and the target should be 100% in quantity. Stock accuracy for Items belonging to other Groups have to be fixed based on requirements.

5.5. Wrong Line of Reporting of Stock Check Staff : In the present organizational structure, the Stock Check Staff is reporting to the W/H Manager. This concept of reporting is against the very fundamental principle of Stock Checking because custodian of the stock, checks and approves the stock discrepancies. In the present condition, there is no chance of getting the real picture and reasons for Digital Stock – Physical Stock misalignment as the correct Stock Check report will never go to Supply Chain Manager and the Top Management. Only the doctored Stock Check Report will come out of the W/H in the present organizational set up.

This present undesirable state of affairs has to be corrected at the earliest. Hence the organizational structure has to be modified so that the Stock Checking Staff should report to Internal Auditor. This will give opportunity for the independent analysis and review of Stock Check report and it in turn will improve W/H performance directly and that of Inventory Control section indirectly.

Independent analysis and review of original Stock Check Report (not doctored) will aid in understanding the Types of errors that can cause Digital Stock – Physical Stock misalignment. The Organization can use FMECA and Root Cause Analysis, in mismatch scenarios to understand the real problems so that recurrences of discrepancies can be prevented in future.

5.6. Absence of Checking of Physical Quantity while Reserving Items as per Material Requests

In the present scenario, when Material Requests (MR) are received in W/H, the staff in the Issue section reserves the materials requested, in the ERP System. This is done without physical checking. Reservation will be effective for those Items having adequate quantities.

Backorders will be generated for the remaining Items having insufficient stock compared to the demanded quantities. Inventory Control section will be notified automatically by ERP System to initiate replenishment actions.

The Issue staff reserves the Items based on the basis of quantities shown as available in the ERP System. In other words, Reservation is done based on the **assumption** that ERP System figures are fully matching with Physical quantities. No physical checking of quantities of Items is carried out at this stage either by W/H staff or Maintenance staff. Based on the reservation of Items, Maintenance Planning and Scheduling are carried out. If any reserved Item is not available in W/H, Maintenance Job cannot be carried out. This is what happened in the Case Study scenario. To overcome this problem, the committee recommended that **before reserving any Item against any MR, the W/H staff should ensure the physical availability of the Item.** The committee further added that it is a must for Maintenance department also to **ensure the availability of Items, before planning the job**, especially Equipment Overhaul jobs whether Minor or Major.

It is true that Automation is undoubtedly an enabler in ensuring accuracy, correctness and timeliness of Stock Availability of Spare Parts, even then manual counter checking is a must, as "Spare Parts are the bread and butter components of conducting maintenance".

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CONTRACTS MANAGEMENT FOR BETTER BUSINESS OUTCOMES IN OIL & GAS / POWER & ENERGY AND OTHER INDUSTRIES

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Companies in different industrial sectors realize importance of better commercial and contracts management in times of recession and poor business results. In times of boom, results are good in spite of operational performance drawbacks and shortcomings. Profitability, Productivity, Quality, Efficiency, Effectiveness, Return on Capital and other parameters of financial and operational performance depend more and more on better management of contracts and agreements with customers, supply contractors, dealers, agents and so on.

Better clarity in goals and business / project objectives contributes towards reasonable and achievable requirements and deliverables that enable both partners of agreements to work towards their business results and goals in a mutually beneficial way. This would help to avoid negotiation and formation of unworkable, lopsided agreements and contracts in the first place.

Many projects get stalled or get into very expensive cost and schedule variances and non-compliance due to faulty planning & execution of the upfront initiation, planning, risk management and design / value engineering phases. If efficient / cost effective / better quality / constructible / safe / sustainable materials / processes / methods are incorporated into the planning and design phases the number of problems/constraints/obstacles to be overcome in execution / implementation stages get reduced to an extent.

Some of the best practices can contribute in this area, namely:

- Proper Contractor / Supplier selection after Pre-Qualifications/Empanelment
- Total clarity on Estimation and Equipment Rates / Labour Rates
- Comprehensive Risk planning/ mitigation strategies for each package or section of the Project
- Material & Method Selection based on Quality & Cost
- Proper Scheduling & Estimation of Reasonable Lead Times
- Priority to Sustainable / Recyclable Materials / Methods
- Better safe than sorry approach to Hazardous / Unsafe Materials / Methods

Contract Administration becomes critical and more important for high technology / value / complexity and long lead time Projects as contract revenue leakage can be caused by so many contributing factors like idle resources/equipment/goods/materials/labour and lower than planned productivity / output levels of equipment / labour and other factors of production.

Engineering changes are best done in the early design stages using techniques like Early supply chain involvement, Risk forecasting etc. However this may not be always possible

and the only alternative for ensuring smooth execution of projects and contracts would be putting in place a good Change and Contract Variation management system during Project execution and Construction stages and this assumes added significance for complex high value / high technology & long duration EPC / Infrastructure projects.

Contract Administration when done efficiently helps company or organization to stay on top of projects by facilitating better clarity on work completion percentages and progress for each project section, payments already made and pending to be made for each section, changes under execution and their costs, changes under consideration / reasons and costs of the same and so on. Contract Lifecycle management becomes relevant at these stages and proper electronic or hard copy documents and records equip the company or division to face successfully audits and also do effective data mining and analysis for future projects, upgrades of running installations and so on. Best value procurement and contracts management in future projects is enabled by more efficient project and contract management in currently running projects.

A database/repository of project and contract information covering all project constraint areas like scope, cost, quality and schedule can also be possibly created for improving the processes/activities of the different projects/operations. Proper computerized document control systems contribute towards this objective and such databases / directory of documents will also help company to defend or raise claims to compensate for losses suffered due to non – compliance with the contracts.

Due to recent advances in information technology, many software packages are available now for contract lifecycle management and consideration can be given to acquiring one of these packages or alternatively in-house company resources can be modified to get the same result i.e. Creation of an efficient system and database for contracts management and compliance. Efficient business processes and contracts management processes contribute towards companies getting better equipped to face times of adversity and recession and maximize or optimize performances and returns in times of economic boom and optimism. In the current scenario, many high value projects are facing excessive delays, design errors and / or execution mistakes, unforeseen risks scuttling projects, force majeure delays, excessive cost and time overruns and so on.

Company personnel and at times supply chain personnel need to be encouraged to gain better understanding of business and contractual processes through use of training sessions, manuals & handbooks, codes of conduct, supplier instruction materials on software / ethics & integrity etc. so that the benefits of excellence in commercial and contracts management are realized in mutually beneficial ways by all the commercial and business stakeholders and partners.

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ADVANCED ANALYTICS IN SUPPLY CHAIN

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Advance analytics in supply chain can leverage more insights with more accuracy as this empowers to take decisions better faster with more confidence. Supply chain analytics bring data driven by intelligence to business, reducing cost, to serve and improve service levels in supply chain. Advanced analytics is to improve operations efficiency and make data driven decisions. Analytics analysis improves forecasting, inventory planning, for products, in supply chain increasing product availability in supply chain.

By analyzing customer data supply chain advanced analytics can help a business predict better future demand which in turn helps organization decide what products can be minimized when they become less profitable or understand what the customer needs only after the initial order to achieve a better lean supply in supply chain management.

Supply chain analytics refers to the improvement in the improvement of the operational efficiency effectiveness by enabling data driven decisions at strategic operational tactical levels. Advanced analytics strategy helps to identify trends, purchasing habits, purchasing behaviors, drive strategic decision making in supply chain.

Management teams in supply can internally utilize advanced analytics strategic building eco-systems for experiencing, an embracing innovation driven in supply chain. Advanced analytics represents the ability to make data driven decisions based on relevant trusted data visualizing graph, charts, in supply chain generating massive amount of data. Advanced analytics helps to make senses to these data in supply chain.

Descriptive analytical: In supply chain this provides visibility from a single source, across the supply chain for both external internal data in supply chain.

Predictive analytic: project disruption, risk, in supply chain for future business applications in supply chain.

Prescriptive analysis: analysis helps organization solve problems, collaborate, for business help logistics; reduce time, effort in mitigating disruptions.

Cognitive analytics' in field of advanced analytics, tries to draw the basic evidence of reasoning from existing data, draw conclusion based on the knowledge existing, and transfers into knowledge for future data base in

supply chain.

In supply chain the ability to analyze performances determine the root cause of issues has become standard functions. Advanced analytics data support supply chain Master Data Management in supply chain provides consistent, standardized managed data across complete supply chain including supplier customs, business.

In supply chain advance analytics share complex data, collaborate with business to improve forecast, accuracy respond to consumer demand reduce inventory improve production with profits providing excellent sales operational inventory planning, involves collaboration within and outside organization.

In supply chain visibility is fundamental to efficient procurement especially if supplier relationship design manufacturing distribution. Advance analytics monitor supplier performance delivery price, service to strengthen negotiation in organization. In supply chain advance analytics, production in shop floor, data, plan schedule production improve quality control costs, reduce waste image they require assets increase efficiency.

In supply chain low cost production operations results from efficient use of warehouse, high inventory, proximity of material requirement, stock out situation.

Advanced analytics gives visibility to the entire supply chain, demand cycle which can optimize storage and movement. In supply chain increase of global transportation, storage, which account for production cost in supply chain. Advanced analytics control cost by tracking efficiency capacity use to select the correct best mode of carrier monitor customer's safety, environmental requirement across the entire supply chain and timely delivery.

Advanced analytics works by analyzing real-time, data predicting future conditions in business, prescribing complex, profitable decisions in supply chain. Advance analytics is suitable for most of current, future success with manufacturing industry.

In supply chain achieving agile optimal clinical trial, supply strategy, challenging by forecasting unpredictable demand, while at the same concerned about the inherent uncertainty, high service, and level

requirement, and advance analytics techniques, lead to the task in supply chain.

In supply chain technology applied in clinical trial supply chain managements to provide forecast, identify opportunities reduce waste, at the same time manage risk in supply chain, optimizing techniques, machine learning, and intelligence in business, and play role in clinical trial, supply forecasting management in supply chain.

Supply chain are getting faster, and so should advance analytics capabilities support decisions, making delivery, planning which can focus on issues which are important, product capability to drive faster decisions making in supply chain. Decisions makers in supply chain are ways to effectively manage data. Data supports integrated business planning in advanced analytic, currently helping organization understands market trends, customer performance. The range of market, sales, social media, demographic, geographical indications, data inputs from various multiple static, dynamic points, provides the capability to predict, proactively plan supply chain activities.

In supply chain Internet of things, machine learning, currently being used in predictive advanced analytic maintenance of assets, to avoid unplanned downtime has become a part of supply chain. Internet of things can provide real-time data to get better production in a manufacturing, by adopting procedures. Machine learning that has been trained in advanced analytic, data accuracy, predicting of any machine failure in supply chain, has been an ardent procedure in supply chain.

In supply chain Advanced analytic data are used to avoid delivery delay by analyzing Global Positioning system, data in addition to congestion of traffic, weather, data to a dynamically plan, to optimize delivery frontiers.

In supply chain in a competitive environment, supply chain is compelled to become more cost effective, using advanced analytic data, procurement, can continually compare real time pricing availability from suppliers, incorporating the history of order, accuracy, transportation, logistic costs, and additional variables in supply chain.

In supply chain discovering new patterns in supply chain, data has the potential to revolutionize the business machine learning as one the pattern of learning through algorithms, supply chain data, needing manual intervention as data requires using a constraint method, and a set of factors with predictive supply chain. Key factors influencing inventory levels, supplier quality demand forecasting, procure to pay, order to cash, productive planning, transportation, using the advance analytic management in supply chain with new insights. Knowledge from machine learning is to revolutionize supply chain management.

In supply chain reducing freight costs, improving supplier delivery performance, minimizing supply risk, are benefits using advanced analytics, in which machine learning in collaborative supply chain networks.

In supply chain the ability to go into the details of analytic data remains critical with other consideration taken into account the real-time environment data acquisition, synthesis, (component or element to form connect a whole) cleansing, processing, alerting and visualization of the critical role in supply chain advanced analytics.

In supply chain speed-to-advance analytics matters more than ever in supply chain, since the capital invested, demand forecasts with suppliers, specific challenges have affected the organization from the best managed supply chains to worst. Every supply chain undergoing perennial top supply chain performers have faced stock outs during the anticipated period of demand.

Supply chain advanced analytic have become less volatile, and the normal demand supply have come into existence in supply chain.

In supply chain the impact of make or buy in procurement strategies, freight options, optimal warehouse, distribution, inventory requirement in different parts in supply chain. Supply chain has made an advanced analytic identification of supply risk factors, in association with analysis, disruption risk, to lower supply as the information collected has found it difficult to build the gap between timely view both into current and predicted total cost.

Advanced analytics has been a break through, and enabled organization to have a single view on total cost on a continuous basis, without interruption in supply chain, by integrating internal, external data with third party on a constant basis, as the manufacturer is able to create a total cost with predictive analysis, exposure to revenue business risk, optimizing working capital.

Advanced analytics in supply chain has been better to understand to continuously optimize orders based on supplier, cost structure, balancing volume in inventory, bringing in price breakages.

The manufacturer links the information in supply chain forecast to understand the better way of flow of products, distribute on an evenly basis to maximize revenue based on promotion and other factors.

Advance logistics has helped suppliers to realize savings on own procurement by bringing down the cost, expenses, and understood the price volatility that affect supply chain. The cost of raw materials, transportation storage, are among the factors that affect product prices commodity prices can be rather volatile, so buyers need to understand when to put under the terms in supply chain. In supply chain cost model can also bring in changes in vendor charges in charges of service,

and help buyers understand the savings that could be realized with their supplier in supply chain.

Advanced analytics have realized the inventory management, demand, forecasting, brings in supply and demand a perfect alignment theirs reducing the overhead cost, that come into additional stocking of items.

Advance analytics has made product availability of machine components that is used to estimate replacement parts in order to meet the assembly line moving in supply chain.

Advance analytics run the program through advance algorithm in order to help organization plan for flow of both supply and demand in supply chain.

In supply chain advance analytic social media, is highly disruptive, unpredictable, then allows procurement in supply chain to enhance communication with suppliers, groups of interest, and presents an opportunity to bring total cost, foster innovation, mitigate risk, and enable good procurement policies in supply chain.

In supply chain the rapid development of digital technologies has completely changed the complete advanced analytics, as digital will continue to evolve, its future inherently unpredictable, as technology continues to develop.

Digital technology, advance analytical has enabled in whatever form to continue the disruptive force for procurement. As analytics improves larger quantities data will be collected increasing detail in real-time, analysis in supply chain. The most fundamental risk, meeting demand, cutting cost, managing risk is important in supply chain.

The major trend in procurement is the movement towards automated process, and virtual tools the rapid revolution in advanced analytics internet of things, connections of machines, internet will make the potential to be used to procurement in a variety of ways in supply chain.

In the cloud computing in supply chain advanced analytic given a real opportunity to procurement, becomes instantly access to digital procurement, as it may be at highly expensive, but at a lower cost. Cloud advanced analytics promotes collaboration between procurement, suppliers, encourages transparency in purchasing, which allows to integrate application of social media in supply chain.

In supply chain Big Data in advance analytic is rather big in every business, and has the capability of analytic, to interpret data, find analysis to make decisions, deliver useful procurement intelligence timely decisions, and facilitate full integration with E-procurement to bring maximum efficiency in supply chain.

Mobile in advance analytics connect across various platforms, flexible for work, and better mean of communication, effective, efficient means in supply chain.

In supply chain, the importance of digital tools used like the virtual payment cards, which is similar to the debit or credit card instrument in supply chain, have the option to have security control over the transaction, provide an option for upper limit in every transaction. In certain virtual cared accounts buyers to specify precisely the purchase, have complete gain on each account, control of the transaction in supply chain.

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COMMODITY INDEX

Commodities	Days's Index	Prev. Index	Week Ago	Month Ago
Index	2808.4	2806.8	2797.0	2788.4
Bullion	5640.5	5634.2	5576.5	5588.7
Cement	2331.0	2331.0	2331.0	2331.0
Chemicals	1803.1	1761.0	1761.0	1782.0
Edible Oil	1798.6	1797.9	1781.4	1640.7
Foodgrains	2534.3	2532.1	2542.5	2471.0
Fuel	2640.3	2640.3	2627.7	2641.3
Indl Metals	1918.8	1918.8	1918.8	1918.8
Other Agricom	2201.2	2201.2	2199.1	2232.2
Plastics	1727.9	1727.9	1727.9	1704.1

Source: ETIG Database dated 20th November, 2019



RECESSION OR RE-SESSION

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Everything Is Money. Every goods and service are valued in terms of Money. In ancient time goods & services are exchanged with goods & services. There was no media of exchange. It's called Barter System. In current age we are using currency notes. In future E commerce we will use plastic currency means credits cards & E payments.

What is Money? Anything which can be accepted by everyone & it should be stored value, called as money. In present age any commodity & services are valued in terms of money. Our trade will not be completed without money.



Velocity of money: The money transfer from one person to another is called as velocity of money. Velocity of Money depends on the following.

- Stable income of people
- Saving habits of people.
- Quality of income.
- Business Cycles.

Income of people: when the income of people is stable, People do more expenses & when the income of people is unstable, they feel instability they don't expense more, hence the velocity of money vary.

Saving habits: in some region people have more saving habits. So they save more & expense less. Conversely some people have less saving habits, so the velocity of money is high.

Quality of income: in some region (communism & socialism) income of people is controlled, so they can't expense more. In that way the velocity of money is limited.

Business cycles & Velocity of Money. There are few phases in business cycle in the phase of prosperity there is high velocity of money. In recession there is low velocity of money.

Types of Business cycles: There are many types of Business cycles. They have different shapes. These

shapes are as English alphabets. "V" shape business cycle shows there was recession, but it changed in prosperity immediately. "L" shapes indicate that there was recession. It's stayed for long time. "U" shape indicated that there was recession it settled for some period again there was prosperity. In current age there are "W" shape business cycles. Recession, then prosperity, again recession, again prosperity.

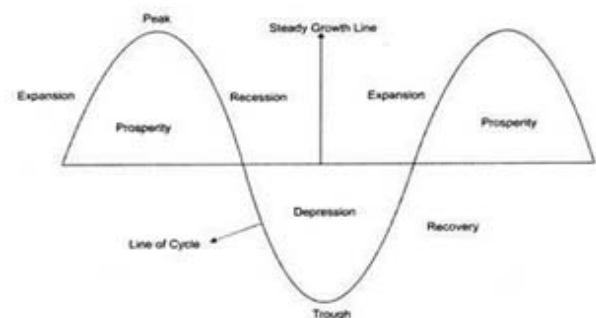


Figure-2: Representation of Phases of a Business Cycle

Phases of Business Cycle: -

Prosperity; in this phase of trade cycle, Demands are increasing so increase in production. It creates high employment opportunities & high purchasing power. There is high investments opportunity to all industries.

Recession: when the economy on the pick of prosperity, recession comes with hidden steps. Prosperity ends, Demand decreases, the confidence of entrepreneur lose & revenue decreases. Less profit cause less investment in business. An employment opportunity also decreases.

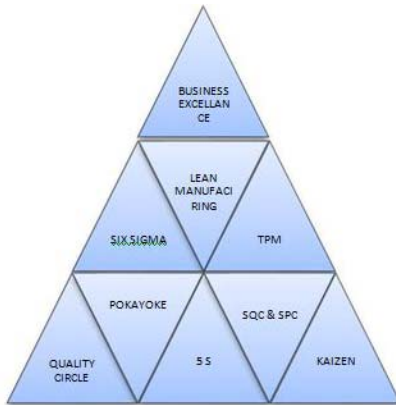
Depression: It is very crucial phase of business cycle. Due to less demand, production decreases unemployment increases. Unused capacity of the machinery causes pessimism among entrepreneur. After this, need for new products & services are creates. Entrepreneur requires new machinery and plants to fulfill the new requirements there are investment opportunities & slowly economy moves to recovery phase.

Recovery: This is upswing phase of economy. In this phase economy starts moving from depression to prosperity. Production rises. It generates revenue for entrepreneur. Expectations of entrepreneur increases. Pessimism starts ending. Economy moves to boom.

Risk & Reward : In every phase there is high risk to entrepreneur. To receive reward, we must take calculated risk. We must sustain business at every phase of business cycle. Management tools will help to entrepreneur. There are so many tools, but manager must

know the use of tools. There are several tools, but every entrepreneur doesn't know how to start & which tools to be used for what. Each tool has their own limitations & bounders. But each tool is complimentary with each other. The tools should be categorized as per its application. Human resource department have important role in development & sustain the organization. Learning & development Dept. must best roll in current situation of economy. Without conceding the training expense, organization should keep on training to employee for transforming organization.

Implementation of the Tools & Techniques: - This diagram shows that how to commence the management tools step by step. Starting from 5S entrepreneurs should rich to high level of business excellence. While implementing tools there should be several steps like follow.



- Training & Education
- Delegation of responsibility
- Participation of all employees
- Audit & review of activity
- Consultation with top level management.
- Benchmarking

In current days production is not important for entrepreneurs but the manufacturing should be lean. It should be respondent to market demand. To make manufacturing lean it is required Supply Chain Management to be Agile.

Managerial tools: -

- 5S & Quality circles
- One Point Lesson & Individual Kaizen
- Poka-yoke & Line Balancing
- Single Piece Flow & Total Quality Management
- T P M & Visual Controls
- S M E D & S.P.C.
- Six Sigma
- P D C A ...etc.

As we are from Supply Chain Management Professional, we will discuss the tools pertaining to SCM: -

- 5S- Seri, Seaton, Siso, Sikestu, Sistuke. With these all 5S we can keep our organization neat & clean well organized.
- Quality Circles-with this tool we can make our organization to work as team on quality .
- Kaizen- With this tool we can generate small good changes in operations. Changes for quality culture

can be introduced.

- Kanban -With this tool material can be supplied as per requirement of production.
- Single Piece Flow- it can reduce excess material in process.
- ABC Analysis- with this tool we can consider the level of inventory. We can reduce money involved in material inventory.
- SPC-Statistical Process Control - with this tool we can monitor & control the quality of process.
- SQA- Supplier Quality Assurance - with this tool we can assure vendor quality& improve it.
- PDCA- Plan, Do, Check, Action. The Deming wheel - A tool given by quality Guru Dr. Edward Deming. It teaches us to improve quality in all aspect.
- FMEA- Failure Mode Effect Analysis-we can study the causes of failure & its effects through analysis.
- Six Sigma-it is Japan's theory to analysis and maintain the quality at 3.4 Nos. defects per million.
- VMI-Vendor Managed Inventory - with this tool we can maintain supply of material as per requirement. The total responsibility of Quality & Quantity belong to vendor. Certified vendor can assure quality of product.
- JIT-Just in Time - with this tool we can maintain material as & when require for production.
- EOQ-Economic Order Quantity-we can minimize the various cost of inventory.
- DMAC-Define Measure analyzes & control - with this tool we can minimize rejections & solve the problems in production. Other many tools can do re-session of the organization.

In current scenario symptoms of economic recession are seen. Currently we are facing in auto industry that the sales are going from bad to worse. As we live in a VUCA (volatility, uncertainty, complexity and ambiguity) world. We must mitigate every challenges of fast-paced world. We must carefully understand its volatilities.

Aggregate risk mitigation strategies to be adopted to reduce the losses. It is important to understanding innovative technologies & be prepared for disruptions. Big data analysis, Drone delivery, Robotics, 3D printing, Virtual / Augmented reality, Artificial intelligent, Robotic surgery, are the innovative changes which will cause disruption in our business. Data analytics and artificial intelligent are influencing end to end business process. Usage of GPRS and GPS systems will help supply chain business in a big way. Industry must grip technical disruption and work on VUCA world. Artificial Intelligent & machine learning to be applied to analyze & manage demand. Process reengineering, savings in overheads, increase speed to market, increase accuracy, reduce cost to market are visible benefits of Digitization.

"IF YOU FEEL RECESION, IT IS TIME TO RE - SESSION"



WTO UPDATE :

DDG WOLFF: THIS IS AN OPPORTUNITY TO INCREASE COVERAGE AND BENEFITS OF GLOBAL TRADING SYSTEM



In a speech delivered at the Center for China and Globalization in Beijing on 20 November, Deputy Director-General Alan Wolff spoke about the current state of the WTO and its future outlook. He highlighted the challenges facing the multilateral trading system but also the opportunities for multilateral progress to be made. He said: "Current challenges must not be allowed to obscure the need for a closer look at the system as it exists today and how it might be improved." This is what he said:

My thanks to the Center for China and globalization and Professor Wang Huiyao for the invitation to speak to you this morning about the current state of the WTO, the World Trade Organization, and its future outlook.

I will briefly address five points:

1. How did the world trading system end up in crisis?
2. Are bilateral agreements an answer to the problems of world trade?
3. Are universal norms even achievable?
4. What actions should WTO Members now take? and
5. What role should China have in moving the trading system forward?

How did we arrive at the current crisis of the multilateral trading system?

There are a number of factors that have come together at the same time that resemble a "perfect storm" arising from a rare combination of adverse meteorological factors.

The factors include the rise of populism in many nations; dislocations in employment that were blamed on trade and not on the greater cause — technological change, which is seen by most as progress; governments were elected that were not imbued with the same spirit of multilateralism that motivated prior administrations; the rise of a major new economic power, China, with an economy that has its own characteristics that differ from those of many of its trading partners; and a loss of unchallenged legitimacy of WTO dispute settlement, leading to the collapse of the appellate level of that system.

It is said by some that the WTO seems to have lost its relevance when it cannot resolve a trade war when all should realize that in human history no treaty could stop a war of any kind if the parties were intent upon having one. Trade-restrictive measures are employed without citing a right to do so under existing international rules. National security has increasingly been used by a number of countries as a justification for the imposition of measures.

Some of the sources of the current crisis are relatively recent. Others have been building for a long time. The dissatisfaction of the United States with the WTO dispute settlement system has been a smoldering resentment that finally led to action. Countermoves are followed by countermoves which have not served to close the divisions over this issue. At the same time as the threat to WTO dispute resolution grew, the rule-making machinery of the multilateral trading system seized up and, with a few notable exceptions, produced no new agreements to liberalize trade over the past quarter century. Worse, both governments and businesses ceased to invest in maintaining and improving the multilateral trading system.

Are bilateral and regional arrangements a substitute for a global trading system? Are bilateral agreements part of the problem or part of the solution?

In public discourse, few commentators understand that all trade agreements, even those not concluded in the WTO, rest on that multilateral foundation.

Some countries can achieve and have achieved deeper integration with their neighbors. This makes eminently good sense. This is what the American and European states have done, it is what the North American Free Trade Agreement did (to a lesser extent but also extensively) and it is what the countries of Africa now seek to accomplish with their African Comprehensive Free Trade Agreement.

It is entirely fair for nonparticipants to ask whether something good for them and the world at large has been accomplished in others' trade agreements. Is the agreement in question more trade-creating than trade-diverting? How does it contribute to global well-being? Are some of its provisions a template for multilateral progress? This is occurring with the mining of sub-multilateral provisions on electronic commerce that are contained in regional trade agreements. If there is discrimination, is it offset by other benefits? Discrimination can occur in two sometimes overlapping forms — preferential market access for signatories (which is usual if not always desirable) and provisions designed to restrict the opportunities of others (with rules of origin and other discriminatory protections).

Are universal norms obtainable?

The threshold to be crossed is whether market forces are to determine competitive outcomes. It is the *sine qua non*, the essential ingredient, for having a workable multilateral trading system. Whether the issues raised are among major trading countries or are north-south issues, between the developed and the developing, a

foundational question is whether the trading system is about convergence or co-existence. The current system, the WTO, is based on convergence. If what is desired is co-existence, that can be achieved, but only at the price of a much lower level of global economic activity, with less current and future prosperity for all.

All trading countries say that they hold the multilateral trading system in high regard and are committed to maintaining and reforming it. Those are soothing words. They must be followed by concrete actions to become reality.

Some think that the future world economy will be bipolar, centered around Beijing and Washington. That is not feasible. It ignores the existence of Brussels, New Delhi, Brasilia and many other capitals, in which self-interest does not divide the world in two, as the Catholic Pope once did for Latin America, or the British and French did in the Middle East with the Sykes Picot line.

Leadership is needed and this does not come without a broader vision, a world view, that sees self-interest as extending beyond the immediate needs of a nation and sees the need for continuation and improvement of global arrangements for the benefit of all.

I am reading a book now about the American Revolution. There were numerous missteps in London and in the colonies that led to rupture and conflict. That cannot be allowed to happen to world trade now. Physical communications are immensely better at present than they were over two centuries ago. We must show that human understanding has also progressed and can now reach across borders.

What should WTO Members now do?

In the near term, there is an important agenda in place for the WTO'S members.

- strenuous efforts are underway
 - to create rules for the digital economy,
 - to impose disciplines on fisheries subsidies,
 - to extend the moratorium on customs duties on electronic transmissions, and
 - to bring forward joint initiatives open to all to facilitate cross border investment and to provide greater international interchange of services governed by domestic regulation.

Serious efforts are also being dedicated to restoring the WTO dispute settlement system's legitimacy and effectiveness.

More is needed. The G20 nations have issued a unanimous call for WTO reform. Current challenges must not be allowed to obscure the need for a closer look at the system as it exists today and how it might be improved. This is an opportunity to increase the coverage and benefits of the multilateral trading system as well as addressing potential deficiencies.

- Given increasing disruptions from natural disasters, it is urgent to find a way forward to improve the movement of undistorted agricultural trade, moving food and feed from areas of plenty to areas of shortage.

- Major gains to the world economy can be found in improving the terms under which services trade takes place.

The government of China is familiar with the concept of planning. This is more challenging in a multilateral setting but is very much needed. It is not unreasonable to set 2025 as a goal for moving to a WTO 2.0 for adoption at MC-15, the third WTO Ministerial Conference after the next one in June 2020

The time is ripe for a renewed charter for the multilateral trading system that —

- Recommits Members to shared ideals and goals, based on the premise that market forces are to determine competitive outcomes;
- Is founded on participation based on a net positive contribution from all WTO Members, without exception, contributed for the common good;
- Recognizes the right to equal trade for all nations and equal opportunities for all participants regardless of gender or how small the size of a business may be; paired with an equal level of obligations except in the case of verifiable limitations of capacity
- Links explicitly once again the cause of peace and the cause of open markets as they were in the first clause of the 1947 Havana Charter for the International Trade Organization. (This is particularly important for the conflict-affected countries, some of whom joined the WTO in recent years and a number of whom now seek to become Members).
- Provides that obligations be fully enforceable as envisaged at the founding of the WTO.
- Protects the environment (such as dealing with plastics in the oceans).
- Combats the scourge of corruption through all Members joining and fully implementing the government procurement agreement.
- Promotes sustainable development through all relevant WTO activities, and that its efforts be made far more effective, directly through training and indirectly through close coordination with other international organizations.
- Provides a new structure of governance whereby —
 - Rule-making consistent with the WTO's objectives becomes more possible;
 - The WTO's dispute settlement system is more responsive to the needs of Members; and
 - The management of the system by its Members as well as their Secretariat becomes more effective and agile in meeting the needs of members, including
 - initiating subjects for negotiation,
 - monitoring and working to assure compliance with existing obligations,

- providing relevant analyses, and
- recommending actions to assure the fostering of the objectives of the renewed WTO Charter.

□ The Vital Role of China in the Multilateral Trading System

China has benefitted enormously from its membership in the World Trade Organization. It has lifted hundreds of millions out of poverty. To achieve this required integration into the world economy through the multilateral trading system.

China has much at stake but also much to contribute to the reform and updating of the global trading system. In many ways China is a leading country, including in the world of e-commerce. Obviously, there are many subjects in which China's full participation will be essential if multilateral progress is to be made.

This includes in the near term the need to conclude a major agreement on fisheries subsidies.

This is a time when China needs to be forward leaning — to improve the multilateral trading system and to assist its own domestic reforms. The WTO Ministerial Meeting in Nur-Sultan, Kazakhstan, in June 2020 will be a time when leadership qualities of WTO Members will be tested. Some matters should be concluded successfully by then. But there is much that will remain to be done, and in this regard, China can help shape and deliver WTO 2025.

My thanks to the CCG, the Center for China and Globalization, for the thought leadership that it provides and for this opportunity to be with you this morning.

Source: WTO Website



RECENT MEASURES TAKEN BY GOVT WILL STIMULATE INVESTMENTS, GIVE PUSH TO GDP GROWTH IN COMING MONTHS, SAYS VENKAIAH NAIDU

- The comments at the 21ST Assocham JRD Tata Memorial Lecture comes in the wake of India's GDP slowing down to a six-year low of 5 percent in the first quarter of the current fiscal
- With the government committed to pursuing various reforms, India has the potential to emerge as one of the leading economies in the next 10 years, Naidu said
- Naidu said the fundamentals of the Indian economy are strong and the country continues to be among the fastest growing major economies of the world Vice President M Venkaiah Naidu exuded confidence that recent measures taken by the government will simulate investments, attract capital flows and give a push to GDP growth in the coming months.

The comments at the 21ST Assocham JRD Tata Memorial Lecture comes in the wake of India's GDP slowing down to a six-year low of 5 percent in the first quarter of the current fiscal and high-frequency indicators like auto sales showing muted performance.

Naidu said JRD Tata was not only a doyen of the Indian industry but also a visionary leader who foresaw a rising India and contributed to nation building in many remarkable ways.

"It is a matter of great pride for us that our nation is rising in stature in various fields—be it economic, geo-political influence, defence, sports, science, IT and space technology," he said.

The theme of the lecture was 'Rising India-Strength to Strength'.

"As far as economy is concerned, I am quite confident that the recent measures taken by the Government of India will simulate investments, attract capital flows and give a push to GDP growth in the coming months," the Vice President said. With the government committed to pursuing various reforms, India has the potential to emerge as one of the leading economies in the next 10 years, he added.

Amid slowdown in economic activities, the government has unveiled a host of measures, including significant reduction in corporate tax, special fund for boosting the housing sector, steps to pump in liquidity in the NBFC sector, among others. Naidu said the fundamentals of the Indian economy are strong and the country continues to be among the fastest growing major economies of the world.

"The right kind of environment has been created for doing business. I call upon the industry leaders to make best use of the opportunities," he said.

In his speech, Naidu stressed that rising India should mean the rise in the living standards of every Indian.

"Not only should there be greater ease of doing business but there should be greater 'ease of living' as well," he said, and added India will rise only if each Indian rises. Referring to the government's flagship Jan DhanYojana, Naidu called upon the private sector to work with the government, financial institutions and NGOs to bring financial literacy to the masses.

Source : Business Press Trust Of India Nov 11, 2019





“INDIA’S MARITIME LOGISTICS SUPPLY CHAIN -HAVING OCEANIC OPPORTUNITIES!”

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Abstract: Maritime transport is critical for the economic development of a country. It influences the pace, structure and pattern of development. The Ministry of Shipping, Government of India broadly encompasses within its fold the shipping and port sectors of the country.

India has a vast coastline of over 7500 km with 12 Major Ports and 187 Non-Major Ports that carry nearly 95% of India’s trade volume. It is an important natural resource for the country’s trade. The maritime sector in India comprises of ports, shipping, shipbuilding, ship repair, ship recycling, Inland Water Transport (IWT), dredging and multi-modal logistics.

Realizing the importance of the maritime sector for economic development, Government of India has announced a number of initiatives to facilitate and grow maritime trade.

More than 150+ projects have been identified for strengthening the maritime infrastructure and increasing the total cargo handling capacity of the country both by Greenfield port development and capacity addition to existing ports. Apart from capacity addition, port efficiencies are being improved through mechanization and modernization.

Key Words : (Maritime, Transport, Logistics, Port, Economic)

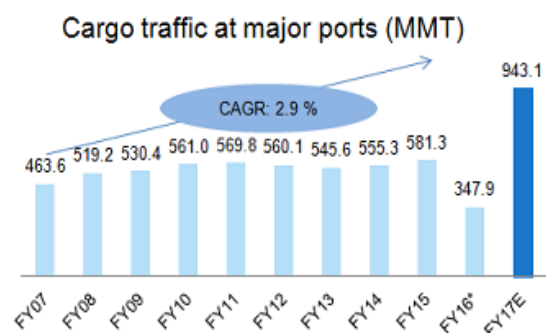


I. Interduction: Market size : The handling capacity of major ports in India is sufficient to match trade demand. The capacity of all the major ports as on March 31, 2015 was 871.52 MMT, compared with 581.54 MMT in cargo traffic handled through 2014–15. Thus, the capacity

utilization through 2014–15 was around 66 per cent. Furthermore, as per internationally-accepted norms, the gap between traffic and capacity is usually around 30 per cent. Additionally, the government has taken several measures to improve operational efficiency through mechanisation, deepening the draft and speedy evacuations.

According to the latest provisional data from Indian Ports Association, the publicly-owned major ports in India reported healthier levels of growth in container throughput in FY 2014–15 than in the previous year. Container-handling in FY 2015 expanded 6.7 per cent year-over-year to 8 million twenty foot-equivalent units (TEUs) from 7.46 million TEUs through the same period in 2013–14. The data also showed that containerised cargo tonnage grew 4 per cent to 119 million tons.

In FY 2014–15, cargo volumes at the major ports expanded 4.7 per cent year-over-year to 581.3 MMT. In FY15, coal cargo traffic grew 13.4 per cent to 118.1 MMT from 104.2 MMT in FY14. With regard to commodities, fertiliser handling rose 19 per cent to 16.3 MMT in FY15. The Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, reported that the Indian ports sector received FDI worth US\$ 1,637.3 million between April 2000 and September 2015. Currently¹, there are about 44 ongoing projects undertaken at major ports in India, with total investment of over Rs 25,870 crore (US\$ 3.88 billion).



Source: Ministry of Shipping, TechSci Research; Note: MMT – Million Metric Tonnes; CAGR – Compound Annual Growth Rate, FY – Indian Financial Year (April-March); FY16* – From April -October 2015

Figures

1. India is one of the fastest growing major economies in the world with an expected GDP growth rate of 7.5% in 2015-16
2. India's long coastline of 7,517 km and a navigable inland waterways of 14,426 km offers immense potential for development
3. 4th most attractive FDI destination in the World as per UNCTAD
4. Over the last decade, seaborne trade has grown at twice the global growth rate of 3.3%
5. Maritime Container trade has grown at 6.5%, which is higher than the world average of 5.4% over the past 10 years (FY 2005 - 2015)
6. Cargo traffic at Indian ports has doubled to 1 billion tonnes per annum over the last decade (FY 2005 - 2015) and is expected to reach 1.7 billion tonnes per annum by 2022
7. US\$ 2.6 Bn invested in Ports and Shipping sector between 2011 and 2014
8. 150 + projects identified in Indian maritime sector offering numerous investment opportunities.

Port Modernization:

India has 12 Major Ports, administered by the Central Government, and around 200 notified Non-Major Ports, administered by the State Governments. In 2014-15, out of the 200 Non-Major Ports, 69 ports were reported to have handled cargo traffic.

The infrastructure sector, particularly the Maritime Sector, is expected to grow significantly with the increase in international and domestic trade volumes.

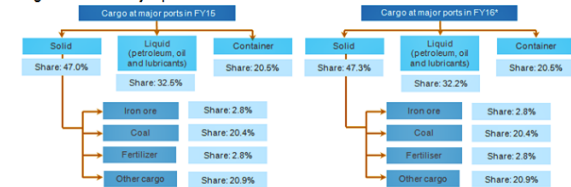
Since about 95% of India's trade by volume is via the maritime route (Source : NTDP), there is a continuous need to develop India's ports and trade related infrastructure to accelerate growth in the manufacturing industry and to aid the 'Make in India' initiative.

Traffic scenario at Indian ports :

The total volume of traffic handled by Indian ports in FY2014–15 was 1052.1 million tons per annum (MTPA), of which 55.25% (581.3 MTPA) of total Traffic, was handled by Major Ports and the remaining 44.75% (470.9 MTPA) of total traffic by Non-Major Ports.

The overall compound annual growth rate (CAGR) of traffic at Indian Ports between FY2005–06 and FY2014–15 was 7.07%, with traffic at Major and Non-Major Ports growing at a CAGR of 3.58% and 13.94%, respectively.

Cargo Profile at major ports in India



Source: Ministry of Shipping, TechSci Research; Note: Other cargo includes Fertiliser Raw Material (dry) and food-grains; FY16: April-October 2015

Port Mechanization and Modernization: It is expected that by 2025, the ports will be required to handle a cargo of 2500 MTPA while the current capacity in India is 1500 MTPA. ~100 MTPA of new capacity can come from the modernization of existing ports. Recognizing the same, Indian ports have already embarked on a massive Port Mechanization and Modernization programme in order to become more efficient and remain at par with international benchmarks. Towards this endeavor, there are various investment opportunities to undertake mechanization projects on PPP basis.

Under Sagarmala, three themes have been identified for port modernization:

Mechanisation : Productivity at several berths is held back by the low capacity equipment used. These are mostly old and were designed for the target productivity levels needed at the time of purchase. Most of the old equipment are grossly insufficient to meet the current productivity requirements. In addition, several of these equipment are heavily derated due to lack of proper maintenance. Critical need of higher capacity equipment to replace existing old ones have been identified at several ports including Kandla, Haldia and Tuticorin. Twenty new mobile harbour cranes have been recommended across major ports. Detailed financial analysis reveals that these investments could be beneficial both for the port as well as the stakeholders. Different issues have been identified across the ports for evacuation issues and the solutions have been unique to each port.

Draft Enhancement (Dredging) : The drafts at major ports have been historically low in comparison to required draft to match with advancements in size and shapes of the ships. Average draft ranges between 12 and 14 meters, peaking to 18 - 19 meters in some places. Globally, most ports have increased their drafts upto 23 meters to handle new generation container vessels with capacity of more than 15,000 TEUs and super tankers. In order to keep pace with accelerating growth in cargo and container traffic, Indian ports would also increase their drafts to handle supermax vessels.

New Terminal Development – Existing ports are limited by their current infrastructure to handle increased traffic expected to come to Indian shores (Both coastal and EXIM) in the next 10 years. There is a potential to increase the capacity at existing ports by building new

terminals and berths. Coastal berth to handle food grains and fertilizers in Kandla is one such example

Potential Projects :

Mechanization

1. Improvement of gate processing (at Chennai, JNPT)
2. Improvement of rake turnaround time (in KDS)
3. Multiple advanced technology based solutions like RFID and OCR based gate processing, etc. have been recommended across the ports. Of these, implementation of several of initiatives is underway.

Draft enhancement (Dredging)

Increasing the draft at Ennore and Paradip from 16 to 18 m

New Terminal Development

1. Edible oil terminal in Kochi
2. Uran multipurpose cargo terminal
3. Nhava creek coastal cargo terminal
4. Ro Ro berths for handling automobile exports at Kandla



Investment Incentives

1. FDI upto 100% under automatic route for port development projects
2. Tax holiday for 10 consecutive assessment years for infrastructure development including ports and inland waterways
3. Reduction in Service tax incidence on coastal shipping from 100% to 30% of the service value
4. Financial assistance like exemption of customs duty and central excise duty on inputs used in ship building and ship repair Viability Gap Funding for PPP projects

Challenges faced In addition to the need to secure substantial investment in port infrastructure, the Indian ports sector will face several other challenges to increasing port capacity and efficiency. Regulatory reform Whilst many of the current policies of the central and state governments of India vis-a-vis the port sector are generally investor friendly, like any system there

are ways in which it could be improved.

There is no doubt that investigating ways in which the approval process can be accelerated would help increase investor confidence (and possibly even appetite), as well as reduce the backlog of projects which are currently putting planning targets at risk. In the longer term, increasing competition with new terminals will help reduce capacity constraints and lead to increased efficiencies at all of the individual terminals. In our experience the Indian legal system is a solid basis upon which to do business and holds no concerns for investors or project financiers (domestic or foreign).

This should not be underestimated in a global market where competition for funding is increasing as liquidity in many key markets still remains scarce. Value added services There is a real need to provide those involved in getting cargo to and from ports with a range of value added services. Many new port developments include plans for facilities such as distriparks, investment in infrastructure to provide better hinterland connectivity and quicker transit routes. Studies also show that each day saved in the custom clearance of cargo saves 0.5% of ad-valorem tariff.

Providing these value added services will attract investment in the Indian ports sector whilst simultaneously improving efficiency and ultimately increasing capacity. Reduction in logistics costs There is also a need for a reduction in logistics costs in the ports sector. Currently, nearly half of India's cargo is internationally transhipped. Transshipment-related costs add to the already high internal logistics costs, which are currently around 14% of GDP. When compared to logistics costs of 5%-9% of GDP in many developed nations, India's costs highlight serious inefficiencies. Poor road infrastructure, a disorganised trucking network, low containerisation levels (as compared against the global average) and lengthy customs clearance times all contribute to

Conclusion : India's high logistics costs and must be addressed in order to increase efficiency. The outlook There are positive signs of progress in India's ports sector and the potential for growth and development is enormous. India is well-positioned as the world's second fastest growing major economy, and the country has emerged from the global economic crisis relatively unscathed. Private sector investment and expertise is keen to play its part. However, in order to support its growing economy and to capitalise on its global position, India must continue to address the capacity constraints facing its port industry. Further investment in and development of the ports infrastructure, along with investor-friendly changes to the regulatory regime, will be key to improving the overall performance of India's ports. Source: jfw.com, google.com

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GROWTH RATE OF INDUSTRIAL, CORE AND MANUFACTURING SECTORS

Global growth is forecast at 3.0% for 2019, its lowest level since 2008-09 as per the World Economic Outlook of the IMF, October 2019. However, despite this global downturn, India continues to grow faster than rest of the world.

A statement of the growth of IIP, Index of Eight Core industries & Manufacturing sector during the last five years is placed below:

Growth of Index of Industrial Production(IIP), Index of Eight Core Industries (ICI) & Manufacturing Sector

Growth/Years	2014-15	2015-16	2016-17	2017-18	2018-19
Overall Growth of IIP	4.0	3.3	4.6	4.4	3.8
Overall Growth of Core Industries	4.9	3.0	4.8	4.3	4.4
Manufacturing Sector	3.8	2.8	4.4	4.6	3.9

Source: 1) Source: National Statistical Office (NSO), 2) Office of Economic Adviser, DPIIT

The growth of industrial sector is an interplay of several factors, like domestic demand, demand for exports, level of investment and prevailing prices. The Government has been continuously taking steps to boost industrial growth including infrastructure sector which includes putting in place a policy framework to create conducive business environment, strengthening infrastructure network and ensuring availability of required inputs. Foreign Direct Investment (FDI) policy and procedures have been simplified and liberalised progressively. The Government has also taken up a series of measures to improve Ease of Doing Business.

Recently, several short- term and long-term measures have been taken to boost investment, production and demand. Corporate tax rate has been slashed to 22% for domestic companies and 15% for new domestic manufacturing companies, drive has been initiated for GST refund to MSME within 30 days, ban has been lifted for purchase of new vehicles in ministries/ departments and tax benefits provided to boost demand of vehicles. The Government has made upfront capital release of Rs 70,000 crore to Public Sector Banks and has made additional provision for lending and liquidity of Rs 5 lakh crore to increase credit flow to industries. To bolster consumption/ demand, the banks have cut interest rates, a move that will lead to lower EMI for home, auto and other loans. To strengthen real estate sector, Alternate Investment Fund has been established to provide last mile funding for completion of stalled projects under affordable and middle-income housing category. Reform momentum towards self- certification, labour laws, environment clearance will boost investment and production.

Following are the sector specific measures taken by the Government to boost the core sector:

Steel- The Government has taken corrective steps to increase the domestic demand in steel sector which among others include trade measures like anti-dumping duties, safeguard duties and notified Quality Control Order thereby making BIS standards mandatory for all steel products and imports. The Government has notified the policy on Domestically Manufactured Iron & Steel Products in government procurements which facilitates domestic value addition and National Steel Policy 2017 with a view to encourage long term growth of domestic steel sector.

Coal- The Government has come up with new methodology for auction of coal mines for sale of coal. The salient features of the methodology for auction of coal are no restriction on the sale and/or utilization of coal from the coal mine; coal can be exported and more flexibility in coal production schedule. FDI to the extent of 100% under automatic route is to be allowed in coal mining activities.

Electricity- Government has introduced various operational reforms to improve the power supply, system performance and financial health of the sector such as DeenDayalUpadhyaya Gram JyotiYojana (DDUGJY in 2014), Integrated Power Development Scheme (IPDS in 2014), Ujwal Discom Assurance Yojana (UDAY in 2015) and Pradhan Mantri Sahaj Bijli Har Ghar Yojana (Saubhagya in 2017). For the promotion of renewable energy, Government has fixed a cumulative target of addition of 175 GW renewable energy based electric installed capacity by 2022 with an objective to promote cleaner and sustainable energy.

Petroleum and Natural Gas: Government has taken several steps to enhance exploration & production of oil and gas in the country which include, Policy for Relaxations, Extensions and Clarifications under Production Sharing Contract (PSC) regime for early monetization of hydrocarbon discoveries, Discovered Small Field Policy, Hydrocarbon Exploration and Licensing Policy, Policy for Extension of Production Sharing Contracts, Policy for early monetization of Coal Bed Methane, Setting up of National Data Repository, Appraisal of Unapprised areas in Sedimentary Basins, Re-assessment of Hydrocarbon Resources, Policy framework to streamline the working of Production Sharing Contracts in Pre-NELP and NELP Blocks, Policy to Promote and Incentivize Enhanced Recovery Methods for Oil and Gas, Policy framework for exploration and exploitation of Unconventional Hydrocarbons under existing Production Sharing Contracts, Coal Bed Methane contracts and Nomination fields.

This information was given by the Minister of Commerce and Industry, Piyush Goyal, in a written reply in the Rajya Sabha Sabha.

Source: PIB

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TRANSFORMING SUPPLY CHAIN AS DIGITAL SUPPLY CHAIN - NEED OF THE DAY (FOR RAISING SUPPLY CHAIN PERFORMANCE TO NEW LEVELS)

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INTRODUCTION: All business organizations and their heads, across all industries, are going ahead and deciding about making their Supply Chains as Digital Supply Chain. The known background is that - Analytics applications that can deliver a competitive advantage appear all along the supply chain decision spectrum ie from targeted location-based marketing to optimizing supply chain inventories to get to know the supplier risk assessment. To work with virtual inventories by taking advantage of centralize supply chain model and by keeping physical stocks at decentralized location to reduce last-mile cost, all to go for Digitalization in Supply Chain.

However, on one side, still many more companies are yet to transform their Supply Chain models by adopting the Digital Supply Chain, the other side happening is, many companies have already embarked on thinking about future Supply Chain Trends new insights and create new forms of value in their business.

When it comes to supply chain, to make it as digital, the traditional differentiation and focus have moved far beyond that of increased efficiency and lowering costs. Therefore, the Digital Supply Chain of today is a sequence of significant special steps taken through distribution, manufacturing, marketing, product development, and finally into the hands of customers / user industry. Also, it is an integrated eco System that is fully transparent and accessible to all players in the world in terms of real time data.

FUTURE APPROACH: As a future approach, companies / organizations/ manufacturers should think and decide on priority, to transform the ongoing traditional Supply Chains to the Digital Supply Chain by focusing on following 7 C's of DIGITAL SUPPLY CHAIN, enumerated by many professional experts at different Net Working Meets.

The 7 C's of Digital Supply Chain Includes:

- Complete
- Connected
- Cognitive
- Compliant
- Content
- Community
- Commerce

The above 'Cs' are very much essential categories of Digital Supply Chain practices that help companies to grow their supply chain digitally, leading to their business growth.

2.1. COMPLETE: Complete in its ability involves the handling of all linked processes and systems required to manage a high-speed digital system. Such a digital network for supply chain includes coordinating suppliers and logistics,

Production planning and control and its scheduling, transport and warehouse management. In Digital Supply Chain, they all connect to form one system rather than several split systems.

2.2. CONNECTED : The Connected in the '7 Cs' connects employees, equipment, logistics providers, suppliers, third parties (including third party producers), and resources. A digital link-up of these processes together ensures everything on the supply chain works at speed, and alteration can be rapidly communicated and managed.

2.3. COGNITIVE : Cognitive with a single digital platform features having built-in predictive analytics. These '7 Cs' avoids separate data storage for analytics and transactions that can move out of sync. Analytics

work directly on the transaction database, thus offering a more accurate and complete Machine Learning and also enables the use of Artificial Intelligence

2.4. COMPLAINT : Compliant is the necessity for everything to function and be the way it should. A complaint process includes areas that involve batches, processes, and tracking Lots. These processes ensure end-to-end quality within the digital supply chain and also permit real-time fast trace to any problems on the platform. A Digital Supply Chain system can be managed, monitored, and maintained through easy upgrades that guarantee system integrity and resilience.

2.5. CONTENT : Content on Digital Supply Chain, accurately portrays as a brand. One would want to portray leads that offer useful information about their brand or specific products. The digital age comes with having good footprints and accessible information at the forefront of their audience / users.

Digital markets today seek high diversification, dynamically changing trends, multiple categories of customer products, and much more.

2.6. COMMUNITY: The essential elements for creating a sense of Community comprise of meeting consumer needs and engagement on digital platforms. Generally target audience has history, priorities, and shared values, belonging, bonding, and membership. Connecting and relating via proper channels to a community makes a better network for Digital Supply Chain. Community takes a two-fold approach in achieving a successful Digital Supply Chain. This two-fold approach includes:

- First approach requires active participation in digital communities.
- Second approach requires brand to be the centre of digital community industry and marketplace.

Having an active in digital community aids in establishing positive awareness for brand. With consistency, brands can easily grow more recognition. Once a reputable name is created within digital community, one would get a more prominent status in the industry.

2.7. COMMERCE: Commerce for Digital Supply Chain

covers as how one would intend to use digital approach towards marketing products, brand and services. The use of digital platforms like eCommerce websites and paid online promotions can increase sales and attract genuine leads.

The utilization of the full capabilities of digital platforms for small businesses and brands reduces the sales cycle, thus saves more time and other valued resources. Along with creative and useful content, leads will now come naturally and pulls in more sales.

3. CONCLUSION: The intelligent enterprise starts the business with Digital Supply Chain.

An increasing number of businesses are realizing the importance of Digital Supply Chain in today's business world, but the transition is slow. It may be because the current solutions are expensive or may not be customize. There is huge potential to create digital Operations Applications, Logistics Application, Sourcing Applications and Linking Applications Across Functions.

Digital Supply Chain is not just another technology. It is the nexus of software, computing, and technological capabilities that has ushered in an era of radically different competition and is a "tech" disruption of historic proportions. Despite the hype, the majority of companies have yet to leverage digitalization for their supply chain operations, they are engaging in random implementation efforts, and many do not know how to proceed. It has to be strategic focus and need to think from the perspective of 4 pillars of Supply Chain Strategy i.e., People, Process, Systems and Execution.

The Digital Supply Chain provides function beyond the traditional focus of reduced cost and better efficiency. In a mature niche, the Digital Supply Chain can serve as an engine to grow profit if appropriately leveraged. As such, Digital Supply Chains take the big move from 'cost' to 'value' chains, as well as optimize the 'push' for supply by creating an adequate 'demand-pull'.

As a result, the 7 C's of Digital Supply Chain is vital to make the transition of traditional Supply Chain to Digital Supply Chain for raising Supply Chain performance to new levels.



GOVT ANNOUNCES STEEL SCRAP RECYCLING POLICY, AIMS TO REDUCE IMPORTS; SCRAP CENTRES PLANNED

The scrap policy will ensure processing and recycling of products in an organised, safe and environment-friendly manner, besides evolving a responsive ecosystem and producing high quality ferrous scrap for quality steel production minimising the dependency on imports.

In a bid to ensure quality scrap for the steel industry, the government on Friday came out with a Steel Scrap Recycling Policy that aims to reduce imports, conserve resources and save energy. The country's steel scrap imports were valued at Rs 24,500 crore in 2017-18, while the deficit was to the tune of 7 MT.

"The policy aims to promote circular economy in the steel sector", besides promoting "a formal and scientific collection, dismantling and processing activities for end of life products that are sources of recyclable (ferrous, non-ferrous and other non-metallic) scraps which will lead to resource conservation and energy savings and setting up of an environmentally sound management system for handling ferrous scrap," the Ministry of Steel said in a statement.

National Steel Policy 2017 aims to develop a globally competitive steel industry by creating 300 MT per annum steel production capacity by 2030 with a contribution of 35-40 per cent from EAF/IF (Electric Arc Furnace/Induction Furnace) route. It said the scrap policy will ensure processing and recycling of products in an organised, safe and environment friendly manner, besides evolving a responsive ecosystem and producing high quality ferrous scrap for quality steel production minimising the dependency on imports.

The statement said the policy envisages a framework to facilitate and promote establishment of metal scrapping centres in India, which will ensure scientific processing and recycling of ferrous scrap generated from various sources and a variety of products. Among others, it also aims to decongest the Indian cities from reuse of ferrous scrap, besides creating a mechanism for treating waste streams and residues produced from dismantling and shredding facilities in compliance to Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016 issued by the Ministry of Environment and Forests.

The policy is based on "6Rs principles of Reduce, Reuse, Recycle, Recover, Redesign and Remanufacture through scientific handling, processing and disposal of all types of recyclable scraps including non-ferrous scraps, through authorized centers / facility". The gap between demand and supply of scrap can be reduced in the future and the country may be self-sufficient by 2030, it added. The ministry said its endeavour is to develop a globally competitive steel industry by adopting state-of-the-art environment friendly technologies.

Although scrap is the main raw material for secondary sector, the primary sector also uses scrap in the charge mix of BOF (Basic Oxygen Furnace) to the tune of 15 per cent to improve efficiency, minimise cost of production and other process needs. There is a worldwide trend to increase steel production using scrap as the main raw material as recycling of scrap helps in conservation of vital natural resources besides other numerous benefits. The use of every tonne of scrap shall save 1.1 tonne of iron ore, 630 kg of coking coal and 55 kg of limestone. There shall be considerable saving in specific energy consumption also, the statement said.

It said the availability of scrap is a major issue in India and in 2017 the deficit was to the tune of 7 MT. This was imported at the cost of more than Rs 24,500 crore in 2017-18. The government said the scrapping policy shall ensure that quality scrap is available for the steel industry. Scrap is an important input for the electric furnaces. If quality scrap is provided as the charge to the electric furnaces, then the furnaces can produce high grade steel. High grade steel scrap shall not have the impurities if processing is done with the scrap processing centres and by shredders etc.

"The current supply of scrap is 25 MT from the domestic unorganised scrap industry and 7 MT from import of scrap. There is potential to harness this 7 MT of scrap that is currently being imported...

"To produce 7 MT more of scrap, the country shall require 70 scrap processing centres each with the capacity of 1 lakh tonnes; this is without disturbing the existing dismantling centres. The 70 scrap processing centres shall require about 300 collections and dismantling centres on the presumption that 4 collecting and dismantling centres cater to scrap processing centre," the statement said. In case of steel production rising to 250 MT, the requirement of scrap shall rise to 70-80 MT, it noted.

"This shall require about 700 scrap processing centres, that is 700 shredders. These shall in turn be fed by 2800-3000 collections and dismantling centres spread all over the country," the statement said. It added operating on the 4+1 hub and spoke model, where 4 collection and dismantling centres are to cater to 1 scrap processing centre, then 400 jobs would be created by one such composite unit.

"And for 70 units producing a total of 7 MT of scrap the potential for employment generation would be of 2800 persons. If the country was to produce 70 MT, as expected as per NSP 2017, the employment generation could be in the range of 3 lakh jobs," the statement said.

Source : www.auto.economictimes.indiatimes.com





CLIMATE CHANGE AND BUSINESS SCENARIO

HENAL SHAH, INSTRUMENTATION ENGINEER
ECM – WOMEN'S WING, IIMM AHMEDABAD BRANCH
henalshah31@gmail.com

Climate change itself is a global problem requiring a **Global Solution**. Just as business operations are important, it is imperative to consider the impact of climate change on business operations, and potential impacts on sustainability. So, the question is how can you deal with climate change? What are the impacts of climate change on business?

Climate change has environmental, social, political, and economic repercussions. Extreme and unpredictable weather conditions, floods, droughts, rapid snowmelt, and rising sea levels are among the major climate change challenges for business operations, and have direct implications for commerce globally. Companies in developing nations are particularly vulnerable. Climate change will have a domino effect on agricultural and production operations. For example, a reduction in the supply of agricultural products and scarcity of water may lead to a reduced food supply and threats to food security, a rapid global increase in commodity prices, social and political unrest, inflation, and finally economic slowdown. With such a scenario, **Business will not be as usual**.

Business will face challenges as never before if climate change impact not better understood and no steps are taken towards appropriate solutions. NOW, it is the time for corporate leaders to rethink very carefully their business models, business priorities, and business sustainability and to consider what climate change may mean for their objectives. How can companies minimise the impact of climate change, lower their risk, adapt to the change, and take advantage of the opportunities that are available?

Acknowledging climate change as an inevitable factor, and recognising the need to adapt, **involves bold decisions by business**. The core message is to know that adaptation adds costs, but lack of adaptation certainly will cost far more.

Climate Change, Supply Chain Management and Enterprise Adaptation: Implications of Global Warming on the Economy aims to provide one among many diverse responses to a growing sense of urgency fed by climate change and experienced by international institutions, governments, local authorities, and enterprises. It provides an interdisciplinary treatment of issues raised by climate change in connection with its implications for society, environment and economy, particularly at the company and the supply chain levels.

The Major Impacts of Climate change in Supply Chains:

Climate change has the potential to slow down our economic growth in the coming decades as temperature changes could reduce incomes globally by roughly 23% by 2100. Another study found that a 4.5°C increase in global temperatures could cut the global domestic product by \$72 trillion. Hidden within these global economic estimates are the effects on individual companies – and unpredictable weather will only intensify these effects, reducing the availability of raw materials and disrupting Supply Chains.

Climate change, as we currently know it, will continue to be a long-term risk to businesses. In the Global Resource Challenges Report, 66% of executives surveyed said climate change had affected the resource challenges their businesses

face. However, only 11% said climate change had increased the priority of resource management. **Those forward-thinking companies are seizing the opportunity to get ahead of their competitors.**

Today, many companies are focusing on sustainability, but it's time to put a greater emphasis on **Climate Resiliency** – a focus that is essential to adapt in and thrive in the era of unpredictable weather. Climate resiliency rejects the concept of business as usual and focuses on **Continuous transformation**.

Change in resource management is needed as evidenced in the outlook for many of those key resources on which our industries rely. We know that we could face a shortage in oil supply by 2020, a 40% shortfall in our water supply by 2030, and a scarcity of rare earth metals used in electronics and batteries today.

To ensure we have the amount of quality resources we need to support our growing global population, business leaders must develop resiliency in 3 major areas as below:

1. Leverage innovation in the form of new materials, services and solutions throughout supply chains
2. Convert raw materials into products more efficiently so we are less dependent on them
3. Effectively retain and invest in the human capital needed to operate successful businesses

Building climate resiliency leads us toward a **Circular Economy**. In this concept, most waste would be reused, recycled or reprocessed. We have already seen this idea gain traction with the European Parliament's recently passed regulations to ensure 70% of household and office waste is recycled by 2030, up from the current rate of 44%. Such regulations will force businesses to make waste reduction a primary part of their strategy.

Now, businesses have an opportunity to get ahead of such regulations and their competitors. It starts with identifying where they can reduce waste within their operations and then design it in to their processes. When doing so, they must be cognizant of the big picture.

Investing in climate resiliency, however, requires the ability to monetize the benefits, which has remained a challenge for many companies. If you are saving on costs at the front end, it's easy to recognize the financial benefit. But **if added costs have an indirect but positive impact on profitability, you must capture that data to show you have chosen the best solution.**

If you were to go back and re-plan, you would have optimized differently. So the question is, how do you optimize now when you put new infrastructure in place? And the answer is **you need much more engineering than you needed before, because any long-lived asset will now go through phases when it exists in essentially different climates. That's a big change.**

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BRANCH NEWS

- ALWAR BRANCH
- AURANGABAD BRANCH
- BANGALORE BRANCH
- COCHIN BRANCH

- HYDERABAD BRANCH
- LUDHIANA BRANCH
- VADODARA BRANCH

ALWAR BRANCH

Indian Institute of Materials Management, Alwar Branch Organized a Seminar on 16/10/2019 by Inviting the Students from the Local Engineering Institutions and the Speakers & Delegates from Industries including Members of IIMM on the Topic “ Role of Digital Technology in Supply Chain Management and its Impact on Industries”



Chairman Mr. Gulab Singh Rathore Welcomed the National Secretary and Treasurer Mr. Lalit Raj Meena , Mr. Vaibhav Modi the Key Note Speaker from M/s GM High Tech Industries (Manufacturers of Automobile Accessories for Export) , Mr. M L Yadav Chairman Institution of Engineers , Alwar Chapter and other dignitaries. Mr. Vaibhav Modi shared his experience on implementation of “SAP” in his Industry and benefit of the same. Reduction in Inventory and Inventory caring cost, Procurement cost, improvement in procurement and purchase cost, ROI , followup for

production , marketing and computing of various information's required for a manufacturing Industry.

The Institute Invited teams of students from Various Engineering colleges of Alwar and the Three teams participated and made the presentation on “ Role of Digital Technology in Supply Chain Management and its Impact on Industries”



The team from National Institute of Engineering and Technology, Alwar's presentation was judged as 1st by the Juri consisting of Five Judges. The Teams from Modern Institute of Technology and Research were judged 2nd and 3rd . The presentation made by all the three teams were appreciated by all the participants and the Members present.

AURANGABAD BRANCH

IIMM Aurangabad has conducted full day training program on “**TOTAL PRODUCTIVE MAINTENANCE AWARENESS**” on 9th November 2019, at Hotel Ajantha Ambassador, Jalna Road, Aurangabad. Faculty for this full day program was Mr. Hari Hari Srirang from, TUV India Pvt. Ltd., Pune and Chief Guest was Mr. Sushilkumar Pujari, Dy. Manager, Group SQA, Endurance Technologies Ltd., Aurangabad.

During training session topic covered are TPM Philosophy, TPM Pillar Structure – 5s System – foundation and structure of 8 TPM Pillars, Vendor TPM, Sixteen Major Losses, OEE Measures and Calculation, JIPM Certifications Norms and TPM Master Plan explain in detail with practical examples. Delegate Seats was limited and fixed 25 from different industries like Balaji Engineering, Sharp Engineers, Shree Saigan Industries, Accrete Electromech Pvt. Ltd, Surya Springs, Aurangabad Pressing, G.S. Engineering, Sanjay Techno Plast, Shubham Engineering, Sheet Shapers India Pvt. Ltd., Sangram Auto and Mauli Metal from Waluj, Chitegaon & Chikalthana based industries at Aurangabad had attended this program.

IIMM Vice Chairman Mr. Sushant Patare briefed about the branch activities and focus areas of IIMM. He also appealed for becoming IIMM members to delegates, who are not IIMM members.

Along with Chairman Mr. K. Srihari, Vice Chairman Mr. Sushant Patare Hon. Secretary Mr. Shrikant Muley, Treasurer Mr. Lalit Lohade and EC Members Mr. M. Phani Kumar, Mr. Sunil Ved, Mr.R.D.Jaulkar took efforts to make this event successful. Program was concluded by National Anthem.



Group Photo with Faculty Mr. Hari Hari Shrirang with participants.



On Dias Left : Mr. Shrikant Muley- Secretary, Faculty Mr. Hari Hari Shrirang, Chief Guest Mr. Sushil Kumar Pujari & Mr. Lalit Lohade - Treasurer

BANGALORE BRANCH

16th November 2019 : Indian Institute of Materials Management (IIMM), Bangalore Branch organized a One – Day workshop on “Inventory Management “at Hotel Ajantha, Bangalore. The sessions were handled by Mr. H.S. Prasanna, Life member and Sr. Faculty and Mr. H.R.T.Chari Distinguished Member and Sr Faculty. Around 35 participants attended from various sectors and we have received very good feedback.



Inaugural address by Mr. Sudhendra D. Director and COO of IB Track



Mr. H.S. Prasanna, Sr. Faculty Handling session

19th November 2019 – In house Training Program: Indian Institute of Materials Management (IIMM), Bangalore Branch conducted an in-house Training program on “Best Practices in Supply Chain Management” for executives of ARIBA Technologies at their premises. Mr. K.S. Mohan Kumar, Sr. Faculty handled the session and covered contents on SCM, Sourcing Management and Strategies, Segmenting procurement, Application of Value analysis / Value engineering methods and discussed some case studies. The program was very interesting with good interaction between the executives and the faculty. The feedback received from participants is “Very Good”.



Mr. K.S. Mohan Kumar, Sr Faculty Handling session for ARIBA

24.11.2019 – Evening Lecture Program: Indian Institute of Materials Management, Bangalore organized Monthly Lecture Program on “Logistic FMEA - A Proactive Approach to assuring Quality in the Supply Chain” by Mr. M.C. Ramakrishnan, retired Vice President (Quality), Bosch Limited, Bangalore and Consultant, Bosch Limited on various Quality Topics. Mr. B. Jayaraman, Branch Chairman welcomed the gathering and speaker. Around 50 SCM professionals attended the program which was well appreciated. Mr. Ramakrishnan impressed on the participants how FMEA approach can help an organization eliminate risks and surprises in managing the supply chain and avoid hidden costs of failure. The session witnessed intense interaction between the faculty and gathering.



*Mr. M.C. Ramakrishnan, Vice President (Quality)
Bosch Ltd (Retd)- Speaker - Talk on Logistics FMEA*

COCHIN BRANCH

Branch conducted a one-day seminar cum workshop on "BETTER PROCUREMENT & INVENTORY STRATEGIES TO OVERCOME THE IMPENDING ECONOMIC SLOWDOWN" on 6th November 2019 at Woods Manor Hotel at Ernakulam. Personnel from various industries; V Guard, OEN, Agape, AVT etc. participated in the program.

The program was inaugurated by Mr. Roby TA; the immediate Past Chairman. He had given a beautiful welcome to the participants and introduced the faculty Mr. Jacob Mathew, winner of Best Faculty award from IIMM at National level.



Shri Roby TA; immediate past Chairman inaugurated "the workshop on Better procurement and inventory strategies to overcome the impending economic slowdown" on 6th Nov 2019. Present Chairman Mr. Jacob Mathew, Hon. Secretary Mr. Shaji KS and Manager from M/s V Guard Industries joined him on the ceremony.

The Chairman and Faculty Mr. Jacob Mathew presented the subject so lucidly to the participants. The presentation had given them a rich experience on the subject and the pros and cons of economic slowdowns; its effect and impact. He stressed the point that, there exists an economic slowdown and the importance is that; the professionals should align the business strategies suitably to avoid the related to this slowdown. This can be achieved by putting strong and

stringent measures for effective resources management.

He explained the latest tools and techniques like usage of artificial intelligence, Virtual realities, supplier segmentation, inventory automation and JIT etc. The sessions were very useful to the participants.



Shri Jacob Mathew, Chairman of Cochin Branch presenting the subject "BETTER PROCUREMENT & INVENTORY STRATEGIES TO OVERCOME THE IMPENDING ECONOMIC SLOWDOWN" in the workshop.

He also informed the participants about the importance of developing sustainable strategies for procurement and inventory management for business growth. IIMM is playing a lead role in the supply chain revolution and advised them to be part of it by taking memberships.

HYDERABAD BRANCH

Going forward, catching up with new SCM Technologies to be in line with Digital India

1. As per the programs, by the time December 2019 MMR is in our hands, we all might have experienced the success of NATCOM 2019 and our new NEC will be on board by taking over from 2017-19 NEC, during NATCOM 2019. We IIMM Hyderabad Branch convey congratulations to the New NEC and NATCOM 2019 organising team.
2. In continuation to our Branch activities, during October 2019 and up to middle of November 2019 we place hereunder the things done as planned.
 - 2.1. On 02-10-19, we have selected this date for our 2nd EC Meeting, to celebrate 150th Birth Anniversary of our Father of the Nation – Mahatma Gandhi and to pay our homage.

Besides carrying on the EC Meeting, we have also paid homage to Bharata Ratna Sir Mokshagundam Visvesvaraya – as post celebrations of 52nd Engineers Day (15th September). In continuation to our felicitating of EC members in view of Teachers Day, in the 1st meeting, few more Members were similarly felicitated during the above EC meeting.



- 2.2. Students Meet: On 02-10-19, we have also conducted Introductory face to face Meet of July 2019 batch students to explain them all issues pertaining to: Timely submission of Assignments, preparation for Exams, about organising Table Talk Classes to clarify their all doubts before their 1st Sem Exams. During this meet, handed over their Membership Kits and Membership Cards.



During above meet, Photo with few students

- 2.3. In terms of CSR, at institute, we have celebrated and organised PUJA during the festivals of Vijaydashami and Diwali.
3. Knowledge Sharing Session (KSS) on 09-11-2019 (at Institute):

WELCOME
Knowledge Sharing Session
Topic: **INTERNATIONAL LOGISTICS**




Speaker:
Mr. MAHESH IYER, Life Member IIMM and Logistics Practicing Expert.
On 09/11/2019, from 10AM
VENUE: At Institute - IIMM Hyderabad.

Program Director Mr. D. Dasaradha Reddy Vice Chairman Mob: 9848416406	Ms. S. Suvama Hony. Secretary Mob: 9704537679	Mr. Md. Ziauddin Hony. Chairman Mob: 9866246796
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- 3.1. As planned we have organised a Knowledge

Sharing Session on 09-11-2019, at Institute on the need of the day topic – **International Logistics**. The topic presentation was done by our IIMM Hyderabad Life Member and Logistics Practicing Expert, Mr. Mahesh Iyer.

- 3.2. During the session, the topic was dealt in depth, keeping all participants in grip, covering National Logistics Policy, Global Trade – What's happening?, Regulatory Environment in India, Stakeholders (External and Internal), KYC – Know your Customer, KYC – Know your Country of Dispatch, Revenue Recognition, Cash Flow, Risk Assessment & Claims and Future of Logistics.
- 3.3. The session was attended by Professionals, Logistics Executives from different Organisations and closed with lunch.



Group Photo of above KSS

4. We the IIMM Hyderabad, continuous to thank our Chief Editor MMR for publishing our Branch News regularly in MMRs and also Technical Papers. The exposure of IIMM Hyderabad in MMRs, is helping us to take forward IIMM Education, Executive Development Programs and Membership Drive.

LUDHIANA BRANCH

दैनिक भास्कर

सेमिनार में बताए आग पर काबू पाने के तरीके



लुधियाना। इंडियन इंस्टीट्यूट द्वारा फायर सेफ्टी पर एक सेमिनार कराया गया। जिसकी अगुवाई समाज सेवक जतिंदर मनचंदा ने की। इस दौरान एमडी अंगद सिंह विशेष तौर से पहुंचे। मुख्य वक्ता डॉ. रakesh आर्या मैबर फायर एंड सिक्योरिटी एसो. ऑफ इंडिया नई दिल्ली के स्टुडेंट्स एजुकेशन विंग के वाइस चेयरमैन ने उपस्थित लोगों को फायर सेफ्टी के विभिन्न उपकरणों और आग को कैसे रोका जा सकता है और बचाव के बारे में बताया। आग लगने के कारण, आग लगने पर क्या और कैसे बचाव किया जाए। इसके बारे में पूर्ण जानकारी दी। फायर सेफ्टी उपकरणों की समय-समय पर जांच और सही संभाल करनी चाहिए। जिस जगह स्लिंडर गैस की लीकेज का खतरा हो। उस जगह किसी भी बिजली उपकरणों व फोन का इस्तेमाल नहीं करना चाहिए। आग लगने की स्थिति में बिजली विभाग को इसकी सूचना देनी चाहिए। इस दौरान एसके अरोड़ा, वाइस चेयरमैन एस पी श्रीवास्तव, जर्नल सेक्रेटरी गगनदीप सिंह, राजेश खन्ना, पिकू शर्मा, बबलु, शमशेर सिंह राणा मौजूद रहे।



VADODARA BRANCH

Evening Talk held on 20th SEPT'19 : An Evening Talk on 'Roof Top Solar System' topic was held on **20/09/2019** from 6.30 PM onwards at our Conf. Hall by **Mr.Jayesh Rathi** which was attended by about 45 members. Mr.Jayesh Rathi has 15 Years' experience in Wind Energy field being associated with Enercon India, Suzlon Energy Ltd. & then 9 Years' experience in Solar Energy field being associated with Hindustan Power Projects Pvt. Ltd. He has been Vice President earlier & presently extending his services as Consultant & Advisor. The Talk covered the following points –

- # What is Solar Energy ?
- # Why Solar Energy ?
- # Roof Top Solar System
- # Types of Solar Panels / Modules.
- # Ground Mounted Solar System
- # State Govt Policies & Central Govt Policies.
- # Current Scenario in Solar Energy

The photos given below display the glimpses of Evening Talk –



Mr.Rakesh Desai-Vice Chairman welcoming Mr.Jayesh Rathi with Flower Bouquet



Mr.Lalbhai Patel-Former National President felicitating Mr.Jayesh Rathi with Memento

Late Shri R.J.Sarvaiya Memorial Evening Talk held on 12th OCT'19 : An Evening Talk in memory of **Late Shri R. J. Sarvaiya** with 'Professional Ethics' topic was held on **12/10/19** from 6.15 PM at our Conf. Hall by **Mr.H.M.Bhatt** which was attended by about 30 members.

Mr.H.M.Bhatt has done B.E(Mech) from M.S.University of Baroda, One Year Materials Mgmt.Course from IIMM-Mumbai, One Year course in Marketing Management from St.Xavier's Social Institute of Industry-Mumbai, Diploma in HRM from IGNOU—New Delhi, Diploma in IT from CMC—Baroda and Advanced International Certificate with Distinction in Purchasing & Supply Chain Management from ITC , Geneva.

He has about 30 years' experience in Materials & Supply Chain Management field & retired from IPCL as Sr.Manager (Materials) in June-2003. The Talk included

presentation to promote morality in Professionals including Statutory authorities like Municipal & Government functionaries. It exhorted participants to practise Ethical standards in their respective professions through personal attributes & doctrine of Karma. It was relevant for students going into profession after Graduation and covered following contents –

- 1) Definition of Ethics, Professional and Corruption.
- 2) Basic Principles of Personal Ethics-Sattwa, Rajas and Tamas “Gunās”
- 3) Doctrine of Karma
- 4) Samskaras-Manifestation of Gunas
- 5) Commandments for Professionals like Competence, Commitment etc.
- 6) Corporate Ethics
- 7) Business Ethics Policy
- 8) Preventive Vigilance.
- 9) Predicaments and Pitfalls.
- 10) Message for India and other Developing Countries

The event highlights are shown in following photos –



Mrs. Sarvaiya offering Flower Tribute at Late Shri R.J.Sarvaiya's Photo in Even. Talk



Mr.Kapil Kumar felicitating Mr.H.M.Bhatt with Memento



Shri N. M. SHAH

Shri N.M.Shah – Ex Controller of Stores-Western Railway, First Head of Materials Dept. in Indian Petrochemicals Corporation Ltd.- Vadodara, Course Director of IIMM-Vadodara Branch and Author of Book “Integrated Materials Management” expired at ripe age of 98 years in Pune on **26th October 2019** after brief illness. He established Materials function at IPCL in 1971 with elaborate procedures & systems and single handedly dictated “Stores,Inventory & Purchase Manuals” for Efficient & Transparent Functioning of Materials Department. He also designed Central Stores Building. After retirement, he settled in Vadodara and was appointed as “Course Director” in IIMM Vadodara branch. He successfully conducted One Year Course in Materials Management, then conducted by Vadodara branch and developed New Courses in Stores Management and Import & Export Management which are now Upgraded as Professional Diploma in Stores Management and Professional Diploma in International Trade conducted by Vadodara branch. He has written a comprehensive Book on “Integrated Materials Management” which extensively covers all functions like Purchase, Inventory, Stores & Logistics and is like Bible for Efficient running of Materials Department. As a Professional in Materials function, he was highly respected for his ethical approach. He was awarded ‘Distinguished Membership’ by IIMM in 2002. We will miss a Giant in Profession of Materials & Supply Chain Management.



The Executive Committee Members alongwith All Members and Staff Members at IIMM Vadodara branch are deeply grieved on sad demise of Shri NATVERLAL MAGANLAL SHAH (our former Course Director who had contributed a lot in consolidating our Educational Activities) on 26/10/19 & offer our Shraddhaanjali to departed Soul.

May God bless the pious soul with Eternal Peace & give courage to the family to bear this sudden loss.

EXECUTIVE HEALTH

OLD-TIME HOME REMEDIES THAT ACTUALLY WORK

Jen McCaffery and Tina Donvito, Reader's Digest International

Honey to heal a wound. Cherries for gout. Cod-liver oil—blech!—to keep your eyes healthy. Your grandmother and her doctors probably swore by these fixes, and now science is catching up with them.

Old-time home remedies : Researchers have produced hundreds of studies in the past five years about the effectiveness of home remedies, but not all the old-time solutions really help. That's why this list focuses on treatments with evidence to back them up. Remember that even natural cures can interact with medications. If you take pills regularly or have a chronic health condition, check with your doctor before trying these.

Buttermilk for age spots : You can skip the expensive skin creams. This rich by-product of butter contains lactic acid and ascorbic acid. One study showed that this combination lightened age spots more effectively than lactic acid alone. Apply to the spots with a cotton ball, then rinse with water after 20 minutes.

Vitamin C for allergies : Vitamin C isn't just good for the common cold; it turns out to be an effective natural antihistamine. In one study, 74 per cent of the subjects who received a vitamin C nasal spray reported that their noses were less stuffy, compared with 24 per cent of the patients who took a placebo. The study's authors recommend getting two grams per day from food and/or supplements.

Comfrey for back pain : This medicinal plant has been used for centuries to treat joint and muscle pain. A study of 215 patients found that applying concentrated comfrey cream to the lower and upper back reduced muscle pain. You can buy it in health food stores and online.

Petroleum jelly for blisters : The rawness from blisters can be painful enough, but chafing can irritate them further. Clean a blister with soap and water, and then reduce friction by applying petroleum jelly to the inflamed area and keeping it covered with a bandage.

Oatmeal for bug bites : "Oatmeal has a long history—and equally solid biological basis—for its anti-itch effects," says Dr. Adam Friedman, an associate professor of dermatology at George Washington School of Medicine and Health Sciences in Washington, DC. You

can find creams containing colloidal oatmeal in any drugstore, or you can make a paste by mixing equal parts oatmeal and water; apply it to the bite for 10 minutes, then rinse.

Aloe for burns : "Aloe is a very soothing remedy for burns," says Dr. Purvisha Patel, a dermatologist and the creator of a line of skin care products. One study demonstrated it was more effective than other treatments for second-degree burns. Make sure you use pure aloe, not a scented version. If you own an aloe plant, simply cut open a leaf and apply the liquid directly to the affected area. For serious burns, you should still see a doctor.

Aspirin for calluses and corns : To create your own corn-softening compound, crush five or six uncoated aspirin tablets into a fine powder. Mix the powder thoroughly with one half teaspoon of lemon juice and one half teaspoon of water. Dab the paste onto the thickened skin, lay a piece of plastic wrap on top, and cover the plastic with a heated towel. Remove everything after 10 minutes and gently scrub away the loosened skin with a pumice stone. Of course, you shouldn't try this if you are allergic to aspirin.

Milk of magnesia for canker sores : Canker sores are ulcers of the mouth that can be caused by viral infections or injuries. To ease the pain, rinse your mouth with milk of magnesia or apply it to canker sores three or four times a day.

Ground flaxseed for constipation : "It's almost as if nature tailor-made ground flaxseed to relieve constipation," says Dr. Will Bulsiewicz, a gastroenterologist. "It is a great source of both insoluble and soluble fiber, which add bulk to the stool and promote the growth of good bacteria." Ground flaxseed is an excellent source of plant-based omega-3 fatty acids, which are known to help soften stool and relieve constipation. Aim for two to three tablespoons a day as part of a **fibre-rich diet**.

Thyme tea for coughs : Thyme is a natural expectorant that relaxes the respiratory tract and loosens mucus. Studies have found that using thyme in combination with primrose or ivy relieves the frequency and duration of coughs. To make thyme tea, place two tablespoons

of fresh thyme (or one tablespoon dried) in a cup of hot water. Allow it to steep, then drain out the herb. Add honey to taste.

Blackberry tea for diarrhea : Blackberries are rich in tannins, substances that can tighten mucous membranes in the intestinal tract. They have long been used as a treatment for diarrhea. Make blackberry tea by boiling one or two tablespoons of fresh or frozen blackberries or dried blackberry leaves in one and a half cups of water for 10 minutes, then strain. Drink several cups a day. You can also buy blackberry tea, but make sure that it contains blackberry leaves and not just flavouring.

Cucumber for eyestrains : Lie on your back and place one cucumber slice (about one-eighth inch thick) over each closed eye. Cucumbers contain antioxidants that studies have shown help decrease swelling and relieve pain. Replace the slices with a cooler pair every two or three minutes, for up to 15 minutes total.

Peppermint oil for headaches : Peppermint essential oil cools the skin, numbing the pain of a tension headache as well as acetaminophen does, according to two small studies. Mix a few drops with olive oil to prevent skin irritation, then gently massage onto your forehead and temples.

Fennel for indigestion : Those tiny seeds that you often see in bowls at Indian restaurants are fennel. They contain carminative agents, which help expel gas from the intestinal tract. Chew a pinch of fennel to help prevent after-dinner belching.

Green tea for joint pain : A potent antioxidant found in green tea called epigallocatechin-3-gallate (EGCG) may put the brakes on the joint pain and inflammation of **rheumatoid arthritis**, according to a study in *Arthritis and Rheumatology*. Researchers suggest drinking two or three cups a day to reap the benefits.

Lemon juice for kidney stones : The most common type of kidney stone occurs when oxalate—a compound found in foods such as spinach, bran, and french fries—builds up in urine and “sticks” to calcium, forming crystals. Drinking at least four ounces of lemon juice per day could help, researchers say, as citric acid can prevent the crystallization of calcium and oxalate that creates these stones.

Olive oil for lip cracking : When you’ve got chapped lips, coat them with olive oil, a natural lubricant that will help soften and moisturize lips nicely. In fact, any vegetable oil will do.

Ginger for nausea : Ginger can help alleviate nausea caused by chemotherapy, morning sickness, or motion sickness. “Although we do not yet understand the exact method that allows ginger to be effective at reducing nausea, it is thought it may work by obstructing the serotonin receptors in the gut that cause it,” says dietitian Erin Palinski-Wade. It also may prompt the body to release enzymes that help break down food. Sip some ginger ale or tea, or chew some candied gingerroot.

Pressure for neck pain : With your thumb or your fingertips, apply steady pressure on the painful spot on your neck for three minutes. Research shows that this simple acupressure technique helps loosen tight muscles to lessen pain

Soy for osteoporosis : A review of several studies conducted at the University of North Carolina, Asheville, found that people who ate foods rich in soy had healthier bones and a reduced risk of fractures. Scientists are still trying to figure out which active compounds may account for the protective effect, but good sources of soy protein include soybeans, soy milk, miso, tempeh, and tofu.

Eucalyptus oil for sinusitis : Give your congested sinuses a steam treatment. Add a few drops of eucalyptus oil to a pot of water, boil, and remove the pot from the stove. Drape a towel over your head and shoulders, then lean forward so it forms a tent over the pan. Keep your face about 18 inches above the water and breathe deeply. The vapor carries droplets of oil into your sinuses and loosens congestion. Studies show that the main ingredient in eucalyptus oil, cineole, can help people recover faster from acute sinusitis.

Clove oil for tooth and gum pain : “Oil of cloves can sometimes soothe an inflamed tooth,” says Dr. Saul Pressner, a dentist in New York City. Clove oil has bacteria-slaying properties and also a numbing effect. Mix a few drops with olive oil to avoid irritation, then swish it in your mouth.

Cranberry juice for urinary tract infections : A study of 373 women with a history of urinary tract infections (UTIs) showed that those who drank a glass of cranberry juice daily had a 40 per cent reduction in the number of UTIs compared with those who drank a placebo. While other studies have been mixed about the effect of cranberry juice on UTIs, scientists think a compound in cranberry juice can prevent bacteria from sticking to the walls of the urinary tract.

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