Friday, 03:30 PM - 05:00 PM

1

Friday, 03:30 PM - 05:00 PM, Room 11 — *Track:* PRODUCT INNOVATION AND TECHNOLOGY MANAGEMENT

Session: PITM 1

Chair(s): Rachna Shah

059-0056 Design for Nano/Micro Manufacturing: A Holistic Approach Towards Achieving Manufacturing Excellence

Salil Desai, Associate Professor, North Carolina A&T State University, United States
Priscila Gomes, Student, North Carolina A&T State University, United States

Advanced manufacturing methods at the nano and micro scale have impacted process efficiencies across several industry sectors over the past decade. Miniaturized manufacturing is ubiquitous for fabricating micro-electromechanical components within products ranging from inkjet print heads, inertial sensors and high-resolution digital displays. In this research we propose a novel “Design for Nano/Micro Manufacturing” (DFNM) paradigm that enables design engineers and operational managers to choose an appropriate nano/micro manufacturing process based on the product category/type. A decision making algorithm “Analytical Hierarchy Process” (AHP) is employed to make unbiased preferential selection of the process based on user defined criteria. The flexible nature of the selection criteria can be adapted to suit different application intent. The AHP process establishes a multi-tier hierarchy of criteria and processes. Candidate criteria for nano/micro process include material compatibility, process scalability, range of feature size, processing time, throughput, etc. The optimal nano/micro process selection is based on a pairwise comparison between the processes for respective criteria. The proposed DFNM methodology is applied towards a case study for fabrications of MEMS components to demonstrate its practical relevance. This research lays foundation for achieving manufacturing excellence within hi-tech industry sectors based on a flexible “Design for Nano/Micromanufacturing” paradigm.

059-0057 Robust design of Differential OpAmps by Constrained Optimization

Tapan Bagchi, Retired, Indian Institute of Technology Kharagpur, India
Nasiba Mandal, Assistant Professor, NMIMS University, India

Abstract-Two separate solutions to a challenging robust design problem-that of a differential operational amplifier used in telephone equipment-were developed by Phadke (1986, 1989) based on Taguchi’s Orthogonal Inner Array ×Outer Array experimental approach and S/N ratios. This present study re-visits that problem in view of several new techniques that have evolved since then. This study finds these newer methods to be remarkably more effective. It is also shown that for such robust design problems marshalling these newer methods is no more complex, and hence could be valuably adapted to similar product or process design challenges.

059-0088 Technology Cost Modelling

Gourav Chellani, Student, National Instituteof Industrial Engineering, Mumbai, India
Mukundan R, Assistant Professor, National Instituteof Industrial Engineering, Mumbai, India
Debanjan Pathak, , ,

In this study we developed an approach for adaptation of new technologies in automotive sector and the cost impact associated with it. Earlier the automobile was simply a valuable means of transportation but now the car has become indispensable for daily life, people are no longer satisfied with the comfort it can provide, they are expecting more. The automobile today shows the individuality of the people, the “it just feel right” factor is dominating. Using the PLAN DO CHECK ACT cycle, the process flowchart and deployment flow chart of different technologies was developed. This is used to develop a technology cost modelling framework, especially for new technologies. The deployment flowchart can be the industry specific chart as different departments perform different functions in different industries. Costing being technology specific, the functional cost analysis is useful to relate the potential technological costs with the benefits generated. We conclude by applying the functional cost framework to develop a technology vs cost tracking ladder for a specific automobile feature. The proposed approach used in this paper helps in identifying and deploying next generation technologies.

059-0136 Exploring the determinants of strategic value and adoption of big data analytics in firms

surabhi verma, Student, National Instituteof Industrial Engineering, Mumbai, India
som bhattacharyya, Associate Professor, National Instituteof Industrial Engineering, Mumbai, India

Abstract: The aim of this research is to identify the determinant factors of strategic value and adoption of big data analytics as perceived by managers in firms. A research model was proposed by combining two independent research stream: strategic value of information technologies (IT) and adoption of IT to study extant of adoption of big data analytics in organizations. The factors identified were drawn from the literature on TOE and PSV based adoption theories and verified by exploratory study. Also the identified variables impact has been studied on the strategic value of BDA. A model comprising of PSV of BDA and BDA adoption has also been proposed. Open-ended semi-structured interview was conducted for data collection. The respondents from different firms across sectors.

059-0043 An approach to translate waste by-product into new products through an integrated research and development

Prashant sharma, Student, National Instituteof Industrial Engineering, Mumbai, India
Mukundan R, Assistant Professor, National Instituteof Industrial Engineering, Mumbai, India

This work attempts to solve a very crucial and live problem of minimising unsold and loss making disposal of a by-product that occurs during the production process. We take an Indian case where the by-product of the main process requires the creation of an end to end mechanism that converts the waste to a profit making operation. It includes product development, marketing and integrating the whole supply chain associated with it in such a way to realize sustainable net profit to the organization as a whole.The first step taken in this case analysis is to identify the most suitable industry as a potential taker of the by-product. A case study was done considering various aspects like major applications of the product, market proximity, requirements of industries amongst others. A relation diagram is prepared to understand the inter-relationship and root cause of the current problem. Pareto and AHP analysis were done as an attempt to assess existing and identify potential new customers who can maximise the uptake of the concerned by-products.

2

Friday, 03:30 PM - 05:00 PM, Room 12 — *Track:* Fresh Connection - Sponsor Track

Session: Session 1

Chair(s):

3

Friday, 03:30 PM - 05:00 PM, Room 12A — *Track:* PRODUCTION PLANNING AND SCHEDULING

Session: PPS 1

Chair(s): Vivek Khanzode

059-0044 A New Approach to Machine Maintenance Replacement and Control of Production Volumes

Dhanishth Khosla, Student, Manipal Institute of Technology, Manipal University, Karnataka, India

Manufacturing today is beyond just product design, quality or demand and supply individually. Key players in manufacturing industry almost all over the world have clearly realized that the best results are obtained by looking at things from a systems prospective, that is by looking at the broader picture. Focus today is on making a better system and not a collection of sub systems with a selected number of them being exquisite and the others satisfactory. While prior studies have looked at altering production with respect to demand, some studies talk about making processes lean and implementing concepts like just in time and close to zero inventory, studies tend to ignore the importance of maintenance and the fact that it often is a barrier towards the implementation of these planed schedules. With preventive maintenance being an obvious preference over repairing machines post break-down, it is actually possible for us to have dynamic maintenance patterns taking into consideration demand. This study, explores that possibility and attempts the design and simulation of an algorithm to synchronize machine maintenance and replacement with production volumes considering expected demand, by using the backward algorithm of dynamic programming.

059-0130 Learning curve effect on materials procurement schedule of multiple sister ships

Vijaya Dixit, Assistant Professor, National Instituteof Industrial Engineering, Mumbai, India

This work aims at integrating materials management with project management of a long duration shipbuilding project involved in manufacturing of multiple sister ships. A single ship production is divided into four key milestones. The milestones of consequent sister ships follow that of previous. Production of first ship takes the longest time and time span between the key events of consequent ships reduces. This is mainly because production drawings are not fully finalized at early stage. Which leads to revisions in design and rework at site and limits the extent of pre-outfitting during block erection of first ship. However, as the organization learns to build the specified type of ship, readily available production drawings ensure correct work progress, reduce rework and increase percentage of pre-outfitting. Sister ships have similar material requirements. The same supplier base supplies materials for all the sister ships within a project. This provides an opportunity to reduce transportation cost by batching the order quantities of multiple ships. However, it increases the inventory holding cost. Due to learning curve effect the production scheduled of each consequent ship gets compressed. Material requirement schedule of every next ship differs from the previous. As more ships get constructed, compressed production schedules increase the possibility of batching the orders.This work addresses above trade-off, incorporates the effect of progressively compressing material requirement schedules and budget constraints of various stages of the project in a mixed integer programming model. Sensitivity analysis determines the threshold number of sister ships required to leverage the advantage of learning curve effect in materials management. This provide insights of: when and to what degree it is beneficial to treat a multiple ship project as an integrated one by batching the order quantities and when and to what degree to practice distinctive procurement for individual ships.

059-0102 Solving a Multi Objective Mixed Model Assembly Line Balancing Problem in Garment Industry

Sandeep Choudhary, Student, PDPM IIITDM JABALPUR, India
Sunil Agrawal, Associate Professor, PDPM IIITDM JABALPUR, India

The motivation of our work is from the paper by Chen et al. (2012) in which the assembly line balancing (ALB) problem in the garment manufacturing process for a single model is solved by using genetic algorithm. Out of four steps of manufacturing the product, we focus on the third step in their paper in which there is a sewing line which is to be operated by different employees having different skill levels. Further, textile industry manufactures many varieties of cloths with different designs and it is not possible to keep new lines for all different designs of cloth. The best way is to launch the models on the same line that can efficiently handle all the different operations needed by the models. This will also reduce the manufacturing cost of the plant. Therefore, in this paper we have considered the stitching of more than one model during the sewing operation on the same line. The problem is to assign proper task to workstations so that machines on workstations can perform the assigned task with balanced workload.

4 Friday, 03:30 PM - 05:00 PM, Room 14 *Track:* SUPPLY CHAIN AND LOGISTICS MANAGEMENT
Session: SCM 1
Chair(s): sachin kamble

059-0006 Enhancing Supply Chain Excellence in Emerging Economics using Text Mining

anirban kundu, Student, Indian Institute of Technology Delhi, India

Supply chain management has emerged as one of the mission-critical issues to enhance manufacturing excellence to achieve sustainable profit in emerging economies. Disruption, being a type of risk in supply chain, affects the harmony of manufacturing operations. For manufacturing company one should have strategies for mitigating such disruptions generated from upstream. Maintaining Supplier portfolio helps to mitigate supply risk in the long run. In this paper we have addressed such disruptions which can be alleviated through increase in visibility among supply chain players. The proposed framework is designed to manage relations with suppliers. Especially the aim is to identify those relations that are critical to manage portfolio. We have used text mining to process open access information and extracted knowledge to infer possible disruption from supplier. The outcome is the depiction of supply chain in a particular time instance. This outcome produces inputs for supplier portfolio. The result also helps the decision maker to cluster suppliers based on such knowledge. We have studied different scenarios to elucidate the utility of this framework for supply chain excellence.

059-0099 Developing a mathematical model to optimize foodgrains storage and transport for public distribution system in

Ajinkya Tanksale, Student, Indian Institute of Technology, Kharagpu, India
Jitendra Jha, Assistant Professor, Indian Institute of Technology Kharagpur, India

Food Corporation of India (FCI) is a nodal agency responsible for procurement, storage and movement of the foodgrains across the states in India. Movement of the foodgrains between the states is the key functional area due to variation in procurement and demand levels. However, in many instances, improper planning and scheduling of the movement of the foodgrains results in unlifted foodgrains, excess transportation cost and underutilization of available storage capacity, which would in turn increases operational cost of FCI. In order to cater the need of streamlining the process of foodgrain distribution, this paper tries to answer the questions- ‘When and how much foodgrains are to be transported from one state to other to meet the demand of foodgrains of each state’. In this paper, an LP based mathematical model is formulated to minimize the storage and transportation cost of foodgrains. The model is solved with Cplex optimization studio and the results are presented which would be helpful to FCI in producing the monthly movement plans

059-0001 Integrated Supply Chain for Disaster Management

Manoj Vanajakumari, Associate Professor, Texas A&M University College Station, United States
Subodha Kumar, Professor, Texas A&M University College Station, United States
Sushil Gupta, Professor, Florida International University, United States

Following a disaster, the aid agencies transport relief items from temporary warehouses (called the Staging Areas) to the point where disaster victims receive aid (called the Point of Distribution). In this research, we propose an integrated optimization model for simultaneously determining (i) the selection of Staging Areas (SAs), (ii) the inventory assignment to the selected SAs, (iii) the selection of the optimal combination of truck capacities, and (iv) the routing of relief goods from the SAs to the Points of Distribution (PODs). Our model is based on (i) the interviews with several emergency management administrators, and (ii) the related documents released by various government agencies. The focus of this paper is on the disasters that can be forecasted in advance. It is widely recognized that optimization models for disaster response have to be different from those for traditional supply chains due to human casualties involved. In order to accommodate this requirement, we introduce a value function that helps to reduce the logistics response time by storing relief items closer to the disaster locations. Since the demand for relief items following a disaster are usually uncertain, we solve the proposed optimization model in a rolling-horizon manner. Based on the results of our model, we present several useful insights. Most importantly, we find that (i) there exists an upper bound on the operational budget beyond which the response operations do not gain any efficiency, (ii) there also exists a lower bound on the budget below which it is not possible to carry out the response operations, (iii) when there is scarcity of budget, it is beneficial to select larger SAs close to the PODs, and (iv) the cost of operations increases when all the trucks are of the same type (i.e., either all trucks are large or all are small) compared to the case when there is a mix of different types of trucks.

059-0117 International Logistics Strategy for Sea Transport

Ritesh Motghare, Student, National Instituteof Industrial Engineering, Mumbai, India

In this study I have done ‘Value mapping’ of the Logistic process as sea transportation plays an important role in International trade contributing to around 60%. Ship Containers are an integrated part of this mode of transportation. The cost structure of different cost factors were identified and all the international data was consolidated which results in targeting the addressable cost.Opportunities in terms of consolidating the volumes for imports-exports were explored. Global subsidiaries import from a common supplier. This opened opportunities of bulk ordering with discounts. Economic order quantity (No. & Size of the containers) for them was calculated, road transportation was also considered. Successful result of this exercise was achieved. Currently different freight forwarder and CHAs (Custom House Agents) were used, exercise of selecting a single FF & a CHA initiated for all the imports-exports processes. Cost benefits of having ‘Factory Stuffing License’ was calculated.

059-0083 Classification of Green Supply Chain Management on the basis of environmental issues: Developing a Relationshi

Anand Jaiswal, Student, Indian Institute of Technology (BHU), India
Cherian Samuel, Assistant Professor, Indian Institute of Technology (BHU), India
Bharat Patel, Student, Indian Institute of Technology (BHU), India
Manish Kumar, Student, Indian Institute of Technology (BHU), India

With the growing need of environmental control, the concepts of Green Supply Chain Management (GSCM) are not only globally accepted but, nowadays, has become an integral part of supply chain processes in most of the corporate sectors. But still, it is a concern that, which of the environmental issues can be dealt with implementing Green Supply Chain Management. This study is to classify GSCM, specifically, on the basis of environmental factors that it takes care of, and to develop a framework explaining the relationship between GSCM and environmental issues. A number of environmental issues that are of today’s concern were identified through detailed literature study and discussion with environmental experts. Essential environmental issues are identified through Analytic Hierarchy Process (AHP). Finally, a relationship framework is established and estimated.

Saturday, 09:30 AM - 11:00 AM

7

Saturday, 09:30 AM - 11:00 AM, Room 11 — *Track:* OPERATIONS MANAGEMENT - EMPIRICAL

Session: OME

Chair(s): Sriram Narayanan

059-0049 Risk assessment of India automotive enterprises using Bayesian networks

satyendra sharma, Assistant Professor, BITS Pilani, India

Purpose: Today's enterprises are facing increased level of risks. It is imperative for companies to assess risk continually. Risks modeling is a complex task because of risks events dependencies and hard task of relevant data. The purpose of this paper is to provide a enterprise risk assessment model that is updated continually. Design/Methodology: Enterprise risk assessment model is provided using Bayesian network methodology for assessing enterprise risks. The networks are used to assess business, economic and external risks and assess its impact on net income of the company. Data for enterprise risk assessment was collected from five automotive companies operating in India. Findings: Companies risk profile results show that companies are more vulnerable to economic risks. The methodology can be used for assessing supply risks, or any business initiative risk.Practical implication: Bayesian network methodology provides a very useful risk assessment tool that combines the advantages of both objectivist and subjectivist risk assessment approaches. Managers can accordingly choose risk mitigation plan.Originality/value: This is a novel effort to provide a assessment tool for enterprise risks in automotive industry.Key Words: Bayesian statistics, Enterprise risk, Risk profile

059-0063 RECENT TRENDS IN OPERATIONS MANAGEMENT: A META-ANALYTIC STUDY

Milind Padalkar, Student, Indian Institute of Management Kozhikode, India
Gopalakrishnan Narayanamurthy, Student, Indian Institute of Management Kozhikode, India
Saji Gopinath, Professor, Indian Institute of Management Kozhikode, India

Research in Operations Management (OM) continues to evolve in terms of topics, themes, motivations, paradigms, and methodologies. Several studies note the shifting nature of OM research across diverse topics; however they generally draw their sources from a single or a few peer-reviewed journals, and do not include a detailed analysis of the research motivations. The dynamism of OM research has led to emergence of new topics in the past two decades. Given that OM literature lacks recent meta-analytic studies, we believe an update on the emergent OM topics along with analysis of research motivations would help OM researchers in developing proper understanding of the emerging research areas. This paper attempts to fill this gap. We limit our analysis to six emergent OM topics, namely Agility, Operations Strategy, Process Design, Project Management, Quality Management, and Sustainability. For our study, we identify sources from peer-reviewed journals and practitioner journals. We report research themes, motivations, methodologies employed, and temporal shifts in the selected topics.

059-0085 Enhancing supply chain efficiency through information sharing in Indian auto-component industry

Deepika Joshi, Assistant Professor, Gautam Buddha University, India

The main aim of presented research is to investigate the influence of information sharing on Supply Chain (SC) performance of Indian Auto-component (IAC) industry. To achieve this objective three research questions were formulated: a) What problems are faced by SC members of IAC industry? b) How does the significance of problem elements vary across the supply chain? c) How does strategies related to information sharing influence SC operational efficiency? To address the questions fifteen SC Performance Elements (SCPEs) were identified from literature. Special emphasis was laid on problems arising from supplier-side, buyer-side and internal processes. A pair-wise comparison questionnaire was prepared and it is administered at 20 Indian auto-components manufacturing firm. An Analytic Network Process (ANP) approach of multi-criteria decision making is used to prioritize the SCPEs and an Industry Specific Priority Index (IPI) was generated. A case study technique was implemented to validate the IPI. Results revealed that information sharing has different degree of influence on fifteen performance elements. Findings revealed that inadequacies in information sharing interrupts SC activities and gives rise to SC problems. Case study highlights that supplier-side problems are primarily related to demand management. It disrupts material-lead-time and on-time-delivery of product, making them critical problem elements on Priority Index (PI). Similarly, internal process problems are linked with resource planning and strategy implementation. Improper information flow to upstream/ downstream partners gives rise to inventory and labour problems, which score high on PI. The buyer-side issues are typically market driven and are least controllable. Any delay in information exchange regarding order cancellation, change in design/ demand pattern can disturb the entire SC. Observations unveils the fact that auto-component manufacturers implement problem specific strategies to reduce the detrimental effect of information insufficiency.Present research draws evidence from information sharing strategies of a case company to mitigate SC problems.

059-0110 The Role of Product Variety, Process Maturity, and Process Change on Internal and External Performance

Bilal Gokpinar, Assistant Professor, University College London, United Kingdom
Sriram Narayanan, Associate Professor, Michigan State University, United States

We examine the impact of product variety on productivity and quality in the automobile industry using a proprietary dataset collected from the automotive industry. Specifically, we examine the role that process maturity and process change play in the impact of product variety on productivity and quality.

059-0111 Supply Base and the Creation of Absorptive Capacity

Surya Pathak, Associate Professor, University of Washington Bothell, United States
James Miller, Associate Professor, University of Washington Bothell, United States
Pradyot Sen, Professor, University of Washington Bothell, United States
Jayanth Jayaram, Professor, University of South Carolina, United States

We seek to explore the synergistic influence of research and development (R&D) and commercialization - components of absorptive capacity - on firm performance. We show that this synergy is context dependent not only on the relative R&D levels of a firm's supply base but also on the type of supply base. We test these relationships by constructing the major supply base for over 336 focal-firms spanning the time frame from 1976 to 2009. The findings from our analyses indicate that the combination of R&D and commercialization investments that improve firm performance differs according to whether firms have Innovative supply bases versus Routinized supply bases. Our analyses also suggest that investments in absorptive capacity affect both short-term and long-term performance of a firm. However, we show that there may be a conflict between improving both short-term and long-term performance measures simultaneously. The nature of this conflict is also different for firms with different types of supply bases. We isolate those combinations of absorptive capacity investments that may lead to improving one performance measure at the expense of the other.

8

Saturday, 09:30 AM - 11:00 AM, Room 12 — *Track:* SUPPLY CHAIN AND LOGISTICS MANAGEMENT

Session: SCM 6

Chair(s): Kashi Singh

059-0072 Inventory performance analysis of Indian retail firms

Saurabh Chandra, Assistant Professor, Indian Institute of Management Indore, India

Retail firms in a particular segment compete on their inventory. Past research on the relationship between inventory performance of retail firms and financial performance measures suggests that firms in this sector determine their inventory policy based on their financial performance and firm specific variables. In general inventory turnover ratio has been found to have inverse non-linear relationship to Gross margin across various retail firms across all segments. Studies conducted in developed markets like USA suggest the direct dependence of inventory turnover performance on financial performance measures like gross margin, capital intensity, sales surprise, along with other factors like firm size and sales growth. Another important inventory performance measure considered in literature is inventory-sales ratio. The aim of our study is to see the trends in inventory performance of Indian retail firms over the years, try to figure out the relationship between inventory performance measures and financial performance measures. We aim at developing an econometrics model with inventory performance as a dependent variable and try to find which of the financial and firm specific variables are related to inventory performance in the Indian context.

059-0060 Design of a Global Supply Chain-Issues and Concerns

Raj Amonkar, Associate Professor, Goa Institute of Management, India

Purpose: In a supply chain network, facilities are the primary components where a product is manufactured or stored. During the phase of design of a supply chain network, a company decides how to configure the supply chain over the next several years. Key driver of supply chain performance in terms of responsiveness and efficiency will be taken into consideration in the decision process and the decisions include the role assigned to each facility, its capacity to perform the assigned role, the number and location of the facilities. Since supply chain design decisions pertaining to facilities are typically made for the long term and are very expensive to alter on short notice, the decisions must take into account uncertainty in anticipated market conditions over the next few years. Decisions regarding facilities are therefore a crucial part of supply chain design. The decision regarding the facility capacity and the actual number and the physical locations of the facilities in the supply chain network is based on the use of frameworks and tools. The key challenge is to assign the role of each facility that is aligned with market requirements. In this paper, the author explains how global supply chain network design decisions could be made in terms of facility roles aligned with market requirements and with uncertainty in market conditions. Design/methodology/approach: Case study approach was utilized to understand the issues and concerns in the design of a global supply chain. ABC, one of the world's leading agribusiness companies with global operations that has made a successful foray in emerging markets was chosen for the study with the use of ABC's actual operating data. Certain names and other identifying information were disguised to protect confidentiality.Findings: Based on the study carried out, it was inferred that the unique classification of facilities in conjunction with the Puttick Grid (developed by John Puttick at the University of Warwick) has helped ABC make sound global supply chain network design decisions in terms of facility roles aligned with the market requirements. It was also inferred that ABC has used the Risk Mitigation tool to mitigate the risks associated with the markets. Research limitations/implications: Study carried out is limited to products manufactured by a single company in agribusiness with the objective of market expansion. Future studies can be carried out for different companies, businesses, products and objectives.Practical implications: This study will be of considerable interest to industry practitioners as it explains key issues and concerns in the design of global supply chains and suggests means of overcoming the issues and concerns. This study will also help other researchers in the critique of supply chain designs with varying products and businesses.Originality/value: According to the author's knowledge, it is believed that this is the first study carried out to understand the issues and concerns in the design of a global supply chain in the context of one of the world's leading agribusiness companies making a successful foray in emerging markets.

059-0097 Evaluating Development Opportunities for Inland Water Transport in India

Alipt Saxena, , ,
Amit Mishra, , ,
Vivekanand Khanapuri, Professor, National Instituteof Industrial Engineering, Mumbai, India

Objective: Navigable inland waterways in India (about 14500 km) constitute less than 1% of the overall transport movement. Inland waterways offer scope of improving the bottom-line. However, cost of transportation through waterways depends on; availability of one way/two way navigation, night navigation and also on infrastructure (availability of mechanised handling) at the terminals. The paper presents both qualitative and quantitative aspects of cost comparison of IWT (Inland Water Transport) with the present modes of transport such as railways and roadways.Methodology: Using secondary data about cost of transportation through IWT between various feasible geographical locations in India, a relationship between cost per tonne and distance travelled in km was estimated. This relationship also factors into account the parameters related to availability of night navigation and mechanised handling at ports. A case has been studied to substantiate how power Industry and Cement Industry can help each other in reducing the total cost through collaboration and availing the benefits of two way navigation.Findings: The study suggests that for one way navigation, fixed cost for transportation per tonne can be reduced by 20.6% if handling of goods on terminals is mechanised. Furthermore, Improvising from one way navigation to two way navigation results in reduction of variable cost of transportation by 50% and fixed cost by 16%. The fixed cost of transportation can further be reduced by 35.3% if handling of goods on terminals is mechanised for two way navigation. Thus, transportation costs can be reduced by collaborating with another company operating on the same route and planning return load.Conclusion: Qualitative and quantitative comparison between various available modes of transportation with IWT for selected routes to enable companies assess how collaboration with other companies for two way navigation can result in maximum benefits with use of Inland Water transportation.

059-0120 Integrating effective flexibility measures and resilience to mitigate supply chain risk

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Vamsee Krishna, Student, Indian Institute of Technology Kharagpur, India
Kashi Singh, Professor, Indian Institute of Management Lucknow, India

In today's highly globalized and interconnected world, an end-to-end view of supply chain is vital to understand and manage supply chain risks. These risks are classified broadly into two categories: operational risk and disruptive risks. The firms have to plan their strategy in a way in which they can overcome these risks and fulfill the customers demand. In order to maintain the supply chain operations under the loss of some structures against these mentioned disruptions, supply chain network needs to be resilient. Thus, to mitigate the supply chain risk, the present study improves the supply chain resilience by strategically incorporating supply chain flexibility. The objective of the model is to maximize resilience and the upstream supplier, internal manufacturing flexibility and logistics flexibility are formulated in the constraints. The model is a non-linear model. Leading companies are looking into higher supply chain flexibility so as to compete in the dynamic customer oriented market. Our problem considers multiple suppliers (s), multiple plants (p), multiple distribution centres (d) and multiple retailers (r).

059-0133 Exploring Green supply chain performance measures framework for Indian Manufacturing Practices

Sadia Samar Ali, Associate Professor, New Delhi Institute of Management, India

The world has come a long way from the time of abundant and affordable energy to a time of limited and expensive energy. It is the need of the hour to preserve the lead resources and in the wake of the need for environmental protection, logistics and supply chain managers are required to reduce costs while maintaining good environmental performance standards.Manufacturing firms around the globe are opting for cradle to cradle products that are more energy efficient and environmental friendly. Henceforth, it is now essential that all processes in the supply chain rely on resources that are cost effective and incur minimum cost possible. Researchers started on focusing on the green supply chain management (GrSCM), reverse logistics, in particular, closed-loop logistics in the wake of the growing concerns about global warming and alarming consistent increase in amount of e-waste (comprising majorly of end-of-life ,EoL) electronic and electrical products. Green supply chain management GrSCM ensures the optimal use of resources by integrating the concept of disposal, recycling, reusing or remanufacturing of the product or its parts (Lund 1984). Here researcher has done literature review to derive research objectives to further develop a theoretical framework on identified constructs that are under-going for Green Supply Chain Management practices with the effect of environmental aspects on supply chain management. The purpose of this paper is to explore the antecedents of Indian firms practicing green supply chain management on firm performance in terms of tangible performance measures (i.e. Business performance) and intangible performance measure (i.e. environmental performance).

6

Saturday, 09:30 AM - 11:00 AM, Room 12A *Track:* PURCHASING AND SUPPLY CHAIN

Session: PUSC

Chair(s): Saroj Koul

059-0045 Evaluating Supplier Risk based on Mahalanobis Taguchi System

O S Vaidya, Assistant Professor, Indian Institute of Management Lucknow, India
Manisha Ketkar, Associate Professor, Symbiosis Institute of International Business, India

Suppliers play a vital role in providing right and timely products into the market. Any lapse onthe part of the supplier/s may create manufacturing problems. It is therefore essential to study the risksassociated with the suppliers. In this work, we present a multi-criteria risk evaluation framework forsuppliers using Mahalanobis Taguchi System (MTS) approach. The various criteria considered for thestudy are: the fill rate by the suppliers, the delay of supply, the variation in the agreed costs, andquality related parameters. MTS uses Mahalanobis Distance (MD) to quantify risks and orthogonalarray (OA) and the signal/noise (SN) ratio to optimally select the criteria required for evaluation. MTSis applied to compute an Operational Risk Number (ORN). ORN can be used in identifying preferredsuppliers and taking decision on supplier rationalization. Application of ORN may also result inmaintaining optimum inventory levels, undisturbed production schedules, improvement inproductivity and therefore optimizing cost. The procedure to evaluate supplier risk is explained withthe help of an illustration.

059-0033 SUSTAINABLE PURCHASING IN INDIAN AUTOMOBILE INDUSTRY: AN ISM APPROACH

Sunil Luthra, Student, Department of Mechanical Engineering, National Institute of Technology Kurukshet, India
Dixit Garg, Professor, Department of Mechanical Engineering, National Institute of Technology, Kurukshe, India
Abid Haleem, Professor, Faculty of Engineering and Technology, Jamia Millia Islamia, India

Sustainability in production processes and supporting activities have drawn increasing attention over the past few years. This study focuses upon sustainable purchasing considered as an important research field. Review of literature has helped to identify eight enablers of sustainable purchasing and three performance outcomes of these enablers. These identified sustainable purchasing enablers are: Legalizations; Social responsibility; Suppliers/vendors' involvement; Suppliers/vendors' education programs; Product design for sustainability; Customers' involvement; Management support and Employees' involvement. Three identified performance outcomes of these enablers are: Economic benefits; Environmental benefits and Social benefits. ISM approach has been used to understand the contextual relationships among these enablers, their interdependence and hierarchy levels to adopt sustainable purchasing practices in Indian automobile industry. MICMAC analysis has also been used to classify these enablers depending upon their driving and dependence power. 'Social responsibility' has been report as most important enabler to adopt sustainable purchasing. 'Economic benefits'; 'Environmental benefits' and 'Social benefits' have been found as most dependent and desired outcomes of the present study. This paper will surely help researchers and practitioners in better understanding towards purchasing issues towards sustainable development.

059-0028 Study and Development Vendor Base Rationalization: A study on Indian Manufacturing Sector

Priyanka Verma, Assistant Professor, NITIE, Mumbai, India
Upasna Agarwal, Assistant Professor, NITIE, Mumbai, India
Vellanki Sriharsha, Student, NITIE, Mumbai, India

In response to the increasing competition, organizations are working towards cost cutting, especially in the areas of procurement, plant operations and primary distribution. In order to reduce costs, managing vendor relationship is critical. The philosophy of Supplier Relationship Management (SRM) addressed interactions with the third party participation in a supply chain with the aim of improving its efficiency. Since it is difficult to maintain healthy relationships with several vendors keeping minimum cost, need for Vendor base rationalization arises. Vendor base rationalization is the process of reducing the number of Vendors thus it not only reduces the complexity but also augments the bonding between the vendor and the organization as the company can now work in collaboration with these vendors and thus reduce the costs incurred in the process.Several qualitative (Sourodweep Mitra, 2012) and quantitative (Srinivas Talluri, 2012) models have been developed earlier to assist companies in the process of vendor base reduction, but the applicability of these models is to be known in Indian context. This paper focuses on the development of the framework with the erstwhile developed models as base and tailoring them to Indian context. The research would be from Manufacturing firms' perspective and analysing the information collected from 30 vendors of various companies and thus coming up with a framework that will help organizations to decide upon the number of vendors they can have for effective relations. Bibliography:Sourodweep Mitra, K. A. (2012). Vendor Base Rationalization: An Opportunity to View Supply Chain Through a Single Pane of Glass. The IUP Journal of Supply Chain Management, 62-69.Srinivas Talluri, H. A. (2012). Supplier Rationalization: A Sourcing Decision Model. Decision Sciences Journal, 57-86.

059-0112 Coordination under supply disruption: A game theoretic approach

Mamata Jenamani, Associate Professor, Indian Institute of Technology Kharagpur, India
Pritee Ray, Student, Indian Institute of Technology Kharagpur, India

This paper considers a two-echelon supply chain with a buyer, and multiple unreliable suppliers. The buyer faces demand uncertainty, whereas the suppliers are correlated and subjected to disruption risk. In order to avoid stockout, the buyer makes an option contract with a reliable backup supplier. The study investigates the sourcing strategy of the buyer as well as pricing strategy of the suppliers (both unreliable and backup suppliers). We solve this problem by considering i) a benchmark solution through centralized setting, which maximizes the performance of the entire supply chain, ii) a decentralized setting solution, where the suppliers are both cooperative and competitive. The equilibrium prices for the suppliers (both competitive and cooperative) and the order quantity for the buyer is obtained through numerical study.

059-0046 IDENTIFYING PURCHASING BEST PRACTICES USING THE PROCUREMENT MATURITY MODEL

Saroj Koul, Professor, Jindal Global Buisness School, OP Jindal Global Business School, India
Pravata Behera , Research Assistant, Center for Supply Chain & Logistics Management, OP Jindal Global University, India

Purchasing process can be described as the acquisition of goods and / or services at the best ownership cost, in the right quantity and quality, at the right time and place for the organization. It includes purchasing of simple low value office stationary to high value high-tech machinery. Purchasing process looks after a diverse range of activities including logistics, quality inspection, material storage, inventory control, supplier development, contract management, etc. Due to the vast range of activities under its purview, procurement shares a significant responsibility towards ensuring organizational profitability and promoting organizational quality standards. In this research study, the Procurement Maturity Model (PMM) was developed to assist procurement professionals in implementing procurement best practices as a means to improve the organizational performance and professional skills at a steel company. Initially, a broad set of external elements were identified that have a high correlation to procurement performance: customers, policy, staff, processes, vendors, tools, and organization. After a significant amount of research into procurement best practices, key best practices were then associated with each of the external elements. In turn, for each of the key best practices, a range of common current practices were identified. All of these elements, best practices, and current practices were then combined to create a simple spreadsheet model. The user friendly model could select a current practice and compare the current practice against the corresponding best practice. The model then performed a gap analysis; identifying and prioritizing measures that the user can undertake to implement best practices and improve organizational procurement performance.

10

Saturday, 09:30 AM - 11:00 AM, Room 14 *Track:* SUPPLY CHAIN AND LOGISTICS MANAGEMENT

Session: Inventory and Modeling

Chair(s): Rakesh Verma

059-0101 Consequences of order crossover in (s, Q) inventory systems under stochastic environment

Achin Srivastav, Student, PDPM IIITDM JABALPUR India, India
Sunil Agrawal, Associate Professor, PDPM IIITDM JABALPUR India, India

This paper discusses the issue of order crossover and its effects in order point, lot size (s, Q) inventory systems. Orders are likely to cross when their lead times are stochastic. Two inventory systems are considered to examine the consequences of order crossover. The first inventory system considers a fast moving item having deterministic demand and stochastic lead time. It is assumed lead time demand follows Normal distribution. The second inventory system considers a slow moving inventory item having stochastic lead time and demand during lead time follows a Laplace distribution. The order crossover phenomenon is studied in both systems. Numerical problems are also considered to demonstrate the results. A sensitivity analysis is done to examine the effect of order crossover with change in variance of lead time demand on total cost, lot size and safety stock factor in both systems.

059-0116 Use of fuzzy demand to obtain optimal order size through Dynamic Programing

Priyanka Verma, Assistant Professor, National Instituteof Industrial Engineering, Mumbai, India
Aurobindo Parida, Student, National Instituteof Industrial Engineering, Mumbai, India
Neha Uttam, Student, National Instituteof Industrial Engineering, Mumbai, India

In today's highly competitive business environment, accuracy of demand forecast is the key that can determine the success or failure of organizations. While availability of accurate demand information is practically impossible, the organizations may adopt the available theoretical knowledge to approach the accurate demand as closely as possible. Demand generally depends on factors like price, lead time, promotional offers, seasonal variations, after-sales service, availability of active competitors and many more. In this paper we investigate the effect of some of these factors to the demand product using fuzzy logic. We identify and fuzzify the input factors to find a fuzzy demand which is more likely to be closer to the real scenario. Demand variability bears a direct effect on a firm's decision, related to the quantity to be ordered and that carried as inventory. While demand of a product may vary at larger amplitudes, the total costs of ordering and inventory are desired to be the minimal. We apply a simple dynamic programming approach given by Wagner-Whitin algorithm to determine the order size, using the defuzzified demand.

059-0067 Target Oriented Newsvendor Problem: The Multi-Product Case

Avijit Khanra, Assistant Professor, Indian Institute of Technology Kanpur, India

Profit maximization objective is not appropriate in many business situations. Empirical findings have confirmed that achieving a profit target is often preferred over maximizing expected profit, particularly in uncertain environments. In such cases, maximization of the probability of achieving the profit target is appropriate. The newsvendor literature is limited in this domain, particularly in the multi-product setting. Solution methods are available only for two-product problems with zero stock-out costs and independent product demands. We solved the general multi-product problem.We formulated the problem as a non-linear discrete optimization problem. We considered the problem in its general form, that is, we took non-zero stock-out costs and imposed no restriction on product demand. We identified key properties of the problem, which led to the development of computational method for calculating the probability of achieving the profit target for given stocking decision. We obtained the optimum stocking decision by complete enumeration of the finite search space. We developed faster algorithms for the case of independent product demands.We tested performance of our method using two and three-product instances of the problem. Our method solved the two-product independent demand instances in quick time. Beyond this, our method is not suitable. Even though our algorithms are inefficient, we have shown that our discrete formulation is better than the conventional continuous formulation of the problem. For larger instances, heuristics can be developed using properties of the problem that we identified. Our optimization method can be used to test performance of the heuristics.

059-0121 Design of Efficient Textile Supply Chain in Emerging Economies

Arnab Adhikari, Student, Indian Institute of Management Calcutta, India
Arnab Bisi, Associate Professor, The Johns Hopkins Carey Business School, United States

Since 2000s textile industry has experienced many significant changes like abolishment of Multi Fibre Agreement (MFA), increasing need of vertical integration in the textile industry, popularity of manmade fibre, etc. It has been observed that research related to the supply chain perspective of textile supply chain is limited to developed nations and some specific domain areas. Also, several scholars have advocated the requirement of proper coordination mechanism among textile supply chain members. Based on the activities performed in apparel value chain or textile supply chain, the members of textile supply chain can be classified into cotton producer, yarn producer, and apparel producer. In this paper, a three level supply chain structure is incorporated to represent the textile supply chain of emerging economies in a realistic way. In addition, the interaction among the members of domestic textile supply chain and every player's interaction with the corresponding foreign market are depicted and appropriate contract to achieve the textile supply chain coordination is developed.

13

Saturday, 12:00 PM - 01:30 PM, Room 11 *Track:* SERVICE OPERATIONS

Session: SVOP1

Chair(s): Sushil Kumar

059-0007 Service delivery collaboration under risk aversion

Prakash Awasthy, Student, Indian Institute of Management Bangalore, India
Jishnu Hazra, Professor, Indian Institute of Management Bangalore, India

This study is an attempt to analyse collaboration between a service provider(principal) and an agent, for service delivery. Service provider engages in the marketing of the service while agent contributes toward service quality improvement. Moreover, there is an uncertainty in the quality capability of the agent. The principal and agent are risk averse and their decisions are affected by the level of uncertainty in the agent's capability. Principal decides on pricing and marketing effort while agent decides on process quality. The revenue earned is shared between principal and agent in fixed and predefined proportion. Conditions that incentivize principal and agent for free riding are derived along with expressions for optimal pricing and effort levels. Finally, the impact of proportion of revenue share and the level of risk aversion on the decisions of the principal and the agent are analysed.

059-0036 A Two-Stage CVRP-TSP Heuristic for Food Distribution

O S Vaidya, Assistant Professor, Indian Institute of Management Lucknow, India
Sushil Kumar, Professor, Indian Institute of Management Lucknow, India
Ganpathy L, , ,

Timely distribution of mid-day meals to children studying in government run schools is an important component of social welfare and providing education to under -privileged children. Many NGOs are involved in preparing food and providing logistics support for delivery to schools. Different methods of cooking and distributing the food for the school children are being followed at different places in India. Typically, a fleet of vehicles ply from a centralised kitchen to directly serve various schools. This can be modelled as the classical Capacitated Vehicle Routing Problem (CVRP) and is known to be NP hard. In the context of meals distribution, the routing problem has an additional constraint of maintaining quality by minimising distribution time from kitchen to school for a given number of vehicles.To solve such problems, we propose a two stage CVRP-TSP based heuristic. The proposed heuristic consists of three phases. In the first phase, the schools are formed into clusters. In the second phase, the heuristic identifies one school within each cluster for service and in the third phase, the selected school in each cluster acts as a depot to serve the other schools within the cluster. A proximity based heuristic is used to form clusters for the first phase, the second phase is solved as a CVRP and the final phase is solved as a TSP. This paper presents the problem formulation and the proposed heuristic is illustrated with numerical example.

059-0047 Service Quality Performance: A Comparative Analysis of Domestic Airlines of India

Sajeev George, Associate Professor, S P Jain Inst. of Management & Research, India

Airline industry is one of the fastest growing industries in the world. Despite the high costs of air travel, it is fast transforming from being a luxury to a necessity. Deregulation of airline industry has transformed service quality from being just a managerial attribute to a source of competitive advantage. In the recent past, the Indian domestic market has been witnessing a fierce competition with the current players IndiGo, Air India, SpiceJet, Jet Airways (including Jet Lite) and Go Air experimenting different strategic initiatives to increase their market share. With a couple of new airlines poised to get licenses to operate in the domestic market, the competition is expected to further intensify. There are many common trends across all domestic players which include focus on loyalty programs, bundled services, packages and end-to-end service to achieve superior customer satisfaction and loyalty. The aim of the study is to carry out a comparative study of the key players in the domestic Indian airline industry using different service quality measurement frameworks. It is proposed to capture and analyze the key service quality measures in the pre-flight, in-flight and post-flight categories to draw academic and practical insights. . Use of analytical frameworks such as Kano model and Analytical Hierarchy Process (AHP) are being proposed to help address the research problem.

059-0019 Healthcare Package Pricing

Tushar Tanwar, Student, Indian Institute of Management Bangalore, India

Rising healthcare costs has been one of the major concerns of every economy, especially India being the second most populated country. Government is coming up with different reimbursement strategies to keep healthcare costs under control. One such payment strategy widely being followed is reimbursing health care providers a single price for the whole treatment process rather than paying for each of the service that the patient went through in order to discourage unnecessary care. Also, nowadays the health care providers are advertising different treatment procedures by stating the price beforehand to the consumers in order to stay competitive. In this paper, we study pricing decisions in a situation where a health care provider is faced with cost uncertainty and show how its profit can be optimized.

14

Saturday, 12:00 PM - 01:30 PM, Room 12 *Track:* PRODUCTION PLANNING AND SCHEDULING

Session: PPS 2

Chair(s): Sunil Agrawal

059-0103 Dual Memory based Multiobjective Genetic Algorithm for Solving Eicher Motor Assembly Line Problem

Sandeep Choudhary, Student, PDPM IIITDM JABALPUR, India
Sunil Agrawal, Associate Professor, PDPM IIITDM JABALPUR, India

In this paper simple assembly line balancing problem (SALBP) of assembly plant at Eicher Motors Ltd. Pithampur, Madhya Pradesh (INDIA) is considered with the objective of minimization of workstation for a fixed value of cycle time. At present the total tasks assembling the final product (Medium Commercial Vehicles (MCV)) are distributed among 19 workstations. The number of workstations is identified using traditional method and is arranged in a straight line layout. This paper attempts to improve the existing assembly line of Eicher Motors Ltd by minimizing the number of workstations using a genetic algorithm approach. This is one of the new approaches developed for genetic algorithm which is guided by dual memory to avoid infeasible solution. The advantages obtained are manifold. (1) The number of workstations reduces to 13, (2) The improvement in the following performance factor is also realized, balance efficiency (Eb) is improved by 25.2 percent.

059-0082 Development of fuzzy model to integrate the human intuition with lead time estimation

Neha Uttam, Student, National Instituteof Industrial Engineering, Mumbai, India
Priyanka Verma, Assistant Professor, National Instituteof Industrial Engineering, Mumbai, India

A fuzzy logic based statistical model can be used for various purposes where absolute values of computing are not required. In this paper, human intuition and past experience is required to develop the model for the prediction of lead time in delivering the products. The model is validated by checking correlation with actual process. The fuzzy model is also leveraged for future work/identifying bottlenecks. The need of running a simulation to calculate the lead time in case of change in current operational procedures or customer demand is removed. It represents a continuous function rather than the discrete ones, which takes the value from 0 to 1. Once the range of various inputs (Number of barrels, percentage completion of documentation etc.) is defined, then the method automatically adjusts output in the case of change in the demand of the product. It can be used to predict the lead time of selling the product to customers. A case study has been presented in this paper to illustrate the above approach.

059-0126 Order acceptance and Scheduling in Parallel machines

Venkata Prasad Palakiti, Student, Indian Institute of Technology Madras, India
Usha Mohan, Associate Professor, Indian Institute of Technology Madras, India
Viswanath Ganesan , Senior Business Analyst, Tata Consultancy Systems Limited, India

We consider an order acceptance and scheduling problem in a parallel machine environment. At the beginning of the planning horizon the firm receives a set of customer orders which are characterized by revenue, processing times, due dates, and tardiness penalties. The firm has to decide which orders to accept and schedules on machines to maximize the profit. A mixed-integer linear programming models is developed. We have showed that the complexity of the problem is NP-Hard. We also developed a Branch-and-Bound (B&B) algorithm and e-approximation algorithm is to solve larger data instances. We showed the performance of these algorithms via computational experiments.

15

Saturday, 12:00 PM - 01:30 PM, Room 12A *Track:* SUSTAINABILITY IN OPERATIONS

Session: SUSOP 1

Chair(s): shirish sangle

059-0004 Sustainability Assessment Framework for a Manufacturing Firm: An Exploratory Study

Neeraj Bhanot, Student, Indian Institute of Technology Delhi, India
P Venkateswara Rao, Professor, Indian Institute of Technology Delhi, India
S G Deshmukh, Professor, Indian Institute of Technology Delhi, India

Sustainability is an integrating concept and needs strategic attention in today's scenario. Sustainable manufacturing is an important aspect of sustainable supply chain since most of the firms consume large quantities of resources while simultaneously generating wastes and environmental pollution. Thus, manufacturers need to pursue production activities internalizing negative environmental externalities while maximizing profits and socio-economic benefits. In the Indian context, the percentage share of manufacturing in its Gross Domestic Product varies from 13 to 16 per cent and is continually decreasing since January 2007 as per the World Bank's 2013 Development Indicators dataset. Manufacturing processes are broadly classified into five groups such as casting, forming, powder metallurgy, joining and machining. The focus of our study is on machining group wherein machining processes is divided into two major groups namely, cutting process with traditional machining (e.g. turning, milling, boring and grinding) and that with modern machining (e.g. electrical discharge machining and abrasive waterjet). We study milling and turning as two major material removal processes since these inevitably waste a large amount of materials in the form of scrap, which reduces production rates, and increases the cost of machining. Moreover, the machining parameters need to be optimized properly, since otherwise the processes can have detrimental effects on the surface properties and performance of parts. In the extant literature, though these processes have been optimized considering various response functions and input variables, there does not exist a unified framework to evaluate them from the sustainability point of view. Hence, we propose a sustainability assessment framework for the turning and milling processes so as to improve them analysing various sustainability aspects. An exploratory study is conducted to study all the elements of sustainability evaluations i.e. selection of sustainable manufacturing parameters and establishing relationships in between them in order to evaluate their effect on sustainability.

059-0051 Closed-Loop Supply Chain Management: A Conceptual Framework on Product Acquisition

Jighyasu Gaur, Assistant Professor, IBS Hyderabad, India

Sustainability is a critical issue for long term existence of firms. Closed-loop supply chain (CLSC) is one of the several initiatives taken by firms to achieve sustainability. CLSC requires set of activities for both forward and reverse flow of material. Product acquisition is important and integral activity of CLSC operation. The purpose of this paper is twofold. First, it offers a literature review on the product acquisition management and consumer disposition behavior. Second, it proposes a conceptual framework that extends the existing CLSC setting by introducing consumers' disposition behavior. Our study is first to establish a link between CLSC and disposition practices literature. Our study makes a significant theoretical contribution in the fields of CLSC and consumer disposition practices as it links both of the areas. Firms that have CLSC operation can use our framework to increase better quality product returns which in turn increase profitability.

059-0013 Sustainable Supply Chains for Supply Chain Sustainability

Sirish Gouda, Student, Indian Institute of Management Bangalore, India
Haritha Saranga, Associate Professor, Indian Institute of Management Bangalore, India

Sourcing executives are finding it difficult to maintain an uninterrupted supply of materials from their suppliers due to the increasingly complex supply chains. The increasing occurrence of supply disruptions with high impact has caused the purchasing firms to take various preventive and reactive actions. Surveys of supply chain managers however suggest that very few managers tend to focus on risk mitigation strategies and those who do implement, find them ineffective. In our paper, we try to understand the relationship between the various risk mitigation strategies, supplier sustainability development, and the perceived and actual risk of the purchasing firms using primary data from 136 manufacturing firms. We find that supplier sustainability development efforts result in lower risk and risk perception for the buyer firms.

059-0035 Managing the Supply Risks in Green Supply Chain using Monte Carlo Simulation

Sachin Mangla, Student, Indian Institute of Technology Roorkee, India
Pradeep Kumar, Professor, Indian Institute of Technology Roorkee, India
M. K. Barua, Assistant Professor, Indian Institute of Technology Roorkee, India

Green Supply Chain Management (GSCM) has been emerged as an important theory for industries in improvising their ecological-economic performances. However, Green supply chains (GSCs) consist of a set of various process and activities related to its supply, i.e. at supplier end in business. Different activities at supplier end may involve different risks and risk factors and or drivers in GSC, which may decrease the overall performance. In this paper, we attempt to focus on the supply GSC risk evaluation and management by capturing of the uncertainty and evaluating the risks by means of simulation to demonstrate the delay/disturbance impacts of the risk (i.e., the loss in business). This work follows a procedure in which, initially, the various uncertainties have been identified and assessed. Later, a risk evaluation has been followed in which the Monte Carlo Simulation (MCS) results illustrate the delay/disturbance impacts of the risk is conducted. The inputs in this research are taken from the case example of an Indian poly plastic manufacturing company. The paper ends with some concluding remarks.

059-0135 APPLICATION OF TOTAL INTERPRETIVE STRUCTURAL MODELING TO ACHIEVE ORGANIZATIONAL SUSTAINABILITY

nitin vihari , Student, Indian Institute of Technology Roorkee, India
vinayak vishwakarma, Student, Indian Institute of Technology Roorkee, India
M.K Rao, Assistant Professor, Indian Institute of Technology Roorkee, India

The aim of this paper is to build a hierarchical model with regard to the drivers of Organizational Sustainability (OS), using a Multi-Criteria Decision Making (MCDM) technique such as Total Interpretive Structural Modeling (TSIM). The study identifies the set of drivers with most driving and dependency power along with a visual representation of a hierarchical model in the decreasing arrangement. Drivers of OS are extracted using Content Analysis on the semi structured interviews and the published literature. In order to overcome the self- selection bias and respondent's bias, field survey was also performed using a structured questionnaire, with a sample size of 60 from the select manufacturing companies in India. Both the means are compared and there by the study follows a mixed mode research design. The present study highlights the implications for academicians as well as practitioners. From the practitioner's lens, the study results an indicative list of drivers of OS for the Manufacturing companies in India, at internal, external and connecting levels which enhances the organizational effectiveness. Furthermore, the use of TISM as a methodology to perform exploratory study, to identify the variables of interest and represent their interactions using hierarchical structures envelopes the academic implications.

16

Saturday, 12:00 PM - 01:30 PM, Room 14 *Track:* SUPPLY CHAIN AND LOGISTICS MANAGEMENT

Session: SCM 3

Chair(s): remica aggarwal

059-0077 Integration of Logistics Network in Food Supply Chains using Social Network Analysis

Prashant Barsing, Student, Indian Institute of Management Lucknow, India
Sushil Kumar, Professor, Indian Institute of Management Lucknow, India

Over the recent years the demand for locally produced food is increasing as global food supply system has considerably affected by increasing tonne-kilometres, food safety risk, environmental impact, and disconnection between local food producers and consumers. However, local food suppliers are not in a position to compete with large-scale food-supply systems due to high logistics costs caused by the lack of integration within supply chain. The overall objective of this study is to improve the logistics management of local food supply chains with the help of Social Network Analysis (SNA) tools. In this paper, the local food supply chains were studied to find out different actors which affect overall supply chain efficiency. Here we deal with coordination and integration in local food delivery system. SNA helps us to form the clustering of producers, determining collection centres, forming coordination, integration within the network and further integration into large scale food delivery systems. The locations for collection and distribution centres were determined using sociograms given by SNA. It also helps to determine food traceability system as an integral part of food logistics system which facilitates the integrated management of food supply chain. Compared with large scale suppliers, the local small scale suppliers could reduce travel distance, time and emission, could improve food quality, safety and customer satisfaction. The integration of logistics managements along with clustering, coordination, and optimisation techniques could reduce the transport distances, time, trips, and emission and also, improve the vehicle capacity utilisation in local food-supply chains. As a consequence of reduced transport distances, number of vehicles, improved vehicle capacity utilisation, negative environmental impacts of local food supply systems could be reduced. The study carried out using simulated data; we find SNA techniques, combined with qualitative analysis as a useful mixed approach to supply network analysis.

059-0096 Application of MCDM approach for prioritizing supply chain risk issues and reviewing SCRM literature

SURYA PRAKASH, Student, Malaviya National Institute of Technology Jaipur, India
Gunjan Soni, Assistant Professor, Malaviya National Institute of Technology Jaipur, India
Ajay Pal Rathore, Professor, Malaviya National Institute of Technology Jaipur, India

A systematic literature review process is followed to investigating available literature of supply chain risk management (SCRM). The exhaustive list of risk factors and their causes is prepared by content reading of SCRM literature. Total 343 research articles across six major data bases of management science have been selected, classified, and synthesized and 19 major classes of risk causes have been established. The paper then utilizes analytic hierarchy process (AHP), a multi criterion decision modeling for further analysis of causes of risk and risk factors. The major contribution of this paper is identification of most prevalent risk causes in supply chain using AHP based approach, which shows that supply side and demand side risks are most prominent. The broad objective of risk dominancy is derived by utilizing AHP in a novel manner. On basis of selected criterion the available literature provide a strong basis for addressing the risk factor which is highly ranked as per MCDM method. The synthesis of available literature also provides useful insights for SCRM. The firm's managers can focus on commanding these causes of risk or risk factors to achieve batter efficiency of their supply chain operations.

059-0014 Does a Market Responsive Strategy Increase Supply Chain Risk? - Evidence from Indian Manufacturers

Sreedevi R, Student, Indian Institute of Management Bangalore, India
Haritha Saranga, Associate Professor, Indian Institute of Management Bangalore, India

Today's changing market needs and high competitive pressure forces firms to offer a wider product range, provide more product customization, and offer new products more frequently than they did in the past. As a result, supply chains of firms following market responsive strategies have become more complex, having to deal with significant uncertainties in the environment. Thus firms are increasingly facing higher risks in terms of supply disruptions, production and delivery delays etc. which ultimately result in poor financial performance. Using data from the Indian manufacturing firms, this study aims at understanding the antecedents of supply chain operational risk faced by firms and the conditions under which such risks can be mitigated.

059-0029 Hybrid model of optimal packaging for large scale Engineered to Order Products

Lohith Kumar Menchu, Student, National Institute of Industrial Engineering, India
Mukundan R, Assistant Professor, National Institute of Industrial Engineering, India

Technologies face a number of hurdles as they advance towards reaching the avowed goals of being low cost yet make firms competitive through superior performance and capabilities, especially in the manufacturing environment. A standardized operating practice in the packaging field of manufacturing is the focus on efficiency of the packaging and cost of the packaging.Organizations are looking forward for the sustainable and implementation of 3 R's (Reduce-Reuse-Recycle) concept which helps in standardizing the process. Packaging in the manufacturing industry offering large sized engineered to order (ETO) products needs a safe and damage-free packaging to deliver with efficiency.This study is on one such large ETO manufacturer delivering their products to global markets. The objective of this study is to optimize the cost involved in packaging per metric tonne of the large scale ETO. The above is achieved by a non-linear optimization of the different constraints of reduction in the number of stock keeping units (SKUs), maximum utilization of the packaging space and improved vendor Selection.The packaging space constraint includes dimensions, design specifications based on their physical properties and the best way to pack the large scale ETO. The packaging cost attributed to the material and its consumption rate as per SKU variations are incorporated through the Quality, Cost, Lead time, Delivery and Management perspectives (QCLDM) into a Multi Criteria Decision Model (MCDM). This study thus enabled the large scale ETO firm to have a hybrid model of vendor selection based on its optimal packaging design and move forward in its quest of lower cost yet highly efficient packaging.

059-0081 RDEAHP for supplier selection: A conceptual framework

remica aggarwal, Assistant Professor, BITS Pilani, India

DEAHP has been used by practitioners to solve supplier selection problems. However, this approach suffers from serious drawbacks. DEAHP approach uses counter intuitive priority vectors for inconsistent pair wise comparison matrices. For consistent pair wise comparison matrices as well it sometimes generate illogical weights. This research work provides a conceptual framework for latest Revised DEAHP (RDEAHP) approach to solve supplier selection problem of an Indian automobile company. It will be shown that the RDEAHP not only produces correct weights for inconsistent matrices but also does not suffer from rank reversal when an irrelevant alternative is added or removed. The uniqueness of this research lies in the application of a RDEAHP approach to an automobile manufacturing industry case.

19

Saturday, 02:30 PM - 04:00 PM, Room 11 *Track:* Behavior in Operations Management

Session: BOM

Chair(s): T.T Niranjan

059-0016 Examining Psychological contract in vendor-buyer relationship : proposing a conceptual framework

Upasna Agarwal, Assistant Professor, National Institute of Industrial Engineering, India
Priyanka Verma, Assistant Professor, National Institute of Industrial Engineering, India
Silky Khurana, Student, National Institute of Industrial Engineering, India
Rohit Singh, Student, National Institute of Industrial Engineering, India

In today's highly competitive environment, there is intense pressure to improve supply chain efficiency and effectiveness. In the extant literature, transaction costs theory, which emphasizes the formalized nature of governance in partnerships (Heide and John, 1992) has held a primary role in developing our understanding of inter-firm relationships. However, in recent years building strategic relationships that transcend organizational boundaries has proven a formidable approach to gain competitive advantage. Subsequently, there has been growing interest in inter-organizational relations both in research and practice. Research in this direction, albeit limited, has argued that inter-firm relationships involve more than formal contracts and that values embedded in social relationships play a predominant role (MacNeil, 1980). However examination of “softer issues” impacting supply chain responsiveness is largely absent from the buyer- supplier literature. The objective of this study is to explore softer issues in buyer- supplier relationship in Indian Manufacturing firms. Data were collected from twenty-five Operations Managers/ Materials Managers. Semi-structured interview using critical incidence technique was used to conduct interviews. The results of this study will have managerial and practical implications which are discussed.

059-0008 A qualitative study on communication challenges in production and operations management of high technology org

Nikhil Mehta, Associate Professor, National Institute of Industrial Engineering, Mumbai, India

Evaluation of the sensitivities of human communication at production and operations floor were found to be progressive in the literature, and were found to be affecting productivity in different ways. This study employs 30 middle level technical workmen working in production and operations floor of organizations using high end technologies. Convenience sampling method was used to gather the data. An attempt was made to conduct simulation exercise while conducting training programme on communication effectiveness for them. Associative and Expressive techniques (Linzey, 1959) were used to gather workmen experiences at production and operations floor, and their views that represent their attitudinal state of their mind, and how they work upon identified work-place challenges. Interpretive interactionism (Denzin, 2001) and the Sundin and Fahy method (Sundin and Fahy, 2008) were used to analyze the qualitative data. The implications of the study would help in developing certain cases that bring to exploration of different kinds of human interactions experiences and attitude at production and operations floor in organizations using high end technologies. Such kind of cases were found to be useful in enhancing employee and workplace productivity and enticing excellence.

059-0069 Exploring the Maturity Level of Supplier Relationship Management: A study of Indian Manufacturing Organization

Ravindra Gokhale, Assistant Professor, National Instituteof Industrial Engineering, Mumbai, India
Upasna Agarwal, Assistant Professor, National Instituteof Industrial Engineering, Mumbai, India
Arpan Khurdelia, , ,

Heightened challenges from global competitors during the past two decades have prompted many manufacturing firms to adopt new manufacturing processes. Particularly salient among these is the concept of Supplier Relationship Management (SRM). SRM is defined as the process involved in managing preferred suppliers and finding new ones whilst reducing costs, making procurement predictable and repeatable, pooling buyer experience and extracting the bene?ts of supplier partnerships. Increasing interest in SRM in recent years is a results of organizations’ realization that they have become more reliant on suppliers in terms of innovative power, security of supply, corporate social responsibility, and on-going cost savings.Despite much discussion about the need for nurturance of buyer- supplier alliances, there is a paucity of empirical evidence showing that the extent of development of SRM practices across organizations. The field in India is barren. Based on desk research and expert interviews conducted in Netherlands, PricewaterhouseCoopers (PwC) developed an SRM Maturity Model to help organizations determine their current maturity level and define their future ambition level. The model suggests four levels of a firms maturity, viz - No SRM, Exploring, Established and World Class. This paper focuses on the exploring the SRM Maturity level across Indian Manufacturing Sector. This research captures information and analyzes that so as to come up with a model that will help organizations assess their current level of supplier relations. The results from the model can then be used as a basis of implementing future actions for organizations to improve supplier relationships and gain competitive advantage.

20

Saturday, 02:30 PM - 04:00 PM, Room 12 *Track:* SUPPLY CHAIN AND LOGISTICS MANAGEMENT

Session: SCM 4

Chair(s): Vivekanand Khanapuri

059-0076 AN EMPIRICAL STUDY OF SUPPLY CHAIN RISKS AND A MODEL FOR RISK MITIGATION PLAN: AN INDIAN PERSPECTIVE

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Purpose: This paper presents an empirical study into the Supply Chain Risks that are affecting the Indian organizations. An effort was made to first identify the principle risks and then to categorize them. In the second stage a predictive model was built to predict whether an organization should have a mitigation plan for a particular risk.Research Methodology/Approach: A survey instrument was developed and responses collected. Firstly, the risks were ranked and an exploratory factor analysis (EFA) was carried out to categorize the risks. Secondly, binary logistic regression was carried out to validate the predictive model.Findings: The EFA resulted in 9 factors in which the Supply Chain Risks can be categorized in the Indian Context. The predictive model showed that frequency of occurrence of a risk, severity of the risk and pro-activeness of an organization towards Supply Chain Risk Management are positively related with the odds in favor of mitigation plan for the risk.Managerial Implications: Supply Chain Risks have been identified in the Indian Context and hence this study would help in the identification of some of the latent risks that Indian organizations face. Once identification of the risks has been done, managers can focus on the ways to mitigate them so that potential losses due to the occurrence of such risks can be minimized. The predictive model would help managers in building an optimal portfolio of risk mitigation plans.Limitations: The sample size is not very large and results might not be generalizable. The measure of “pro-activeness of an organization towards supply chain risk management” might suffer from self-report bias.Future research directions: A scale can be developed to measure the pro-activeness of an organization for Supply Chain Risk Management. Quantification of the Risks and their impact on the bottom line can be studied in future.

059-0042 Analyze & Design Efficient Logistics system: A case study of midsize FMCG Company in India

Silky Khurana, Student, National Institute of Industrial Engineering, India
Rekha chikhalkar, Associate Professor, National Institute of Industrial Engineering, India
Arpan Khurdelia, Student, National Institute of Industrial Engineering, India

In today's fast paced business environment, superior logistics performance is a prerequisite to become and stay competitive. An effective logistics system contributes immensely to the achievements of the business and marketing objectives of a firm. Thus any effort to optimize the logistics makes the supply chain more efficient and responsive. The challenges for midsize FMCG Company are immense, due to availability of limited resources which are to be used to cater to the intense distribution network. The logistics cost range between 10% - 30% of sales of FMCG companies in India. Designing an efficient system to reduce this cost gives an edge to the company in this competitive scenario. This paper analyses the cost of outbound logistics and suggests measures to bring down the secondary logistics cost to cater to demand of PAN India. The research is based on a case study of midsize FMCG Company located in Gujarat near Surat. The existing logistics system is analyzed & an efficient logistics system that improves order fulfilment and customer demand responsiveness is designed. Cost benefit analysis is done considering various relevant dimensions such as market dynamics, service levels, tax structure, transportation costs etc. This paper also studies the impact of GST implementation on the logistics system of this company. The challenge to recommend an optimal network configuration that will allow for longer term optimal results despite of environmental turbulences was attempted for a midsize company.

059-0064 Supply networks of Korean manufacturing firms in China: a case study of Suzhou Industrial Park

Zheng Liu, Lecturer, Xi'an Jiaotong-Liverpool University, China
Hyungmin Kim, Lecturer, Xi'an Jiaotong-Liverpool University, China

With the focus on innovation and international collaboration, Suzhou Industrial Park (SIP) has attracted over 4700 foreign enterprises, including one-fifth of the Fortune 500 multinational corporations (MNCs). SIP is continuously encouraging new foreign direct investment (FDI). As a result, there is currently massive presence of foreign manufacturing firms, among which are the most active Korean manufacturing firms in the IT industry. The operations of Korean manufacturing firms have built strong and complicated supply networks among Koreans firms, Chinese firms and other international firms. Thus, the aim of this study is to develop a better understanding of supply networks involved manufacturing FDI, with a focus on the Korean firms in SIP. By reviewing the key literature in International Strategy and Operations Management, a research framework is generated to capture the reasons for FDI, day-to-day operations challenges, and the upstream and downstream links, which is further improved through pilot case studies by interviewing managers from Korean manufacturing firms in SIP. The preliminary research finding shows that large Korean MNEs, such as Samsung and LG, have played a leading role in the expansion of Korean manufacturing networks in Suzhou. They used to rely on Korean small and medium enterprises (SMEs) by virtue of easy communication and control, but localisation strategies, adopted due to excessive competition between local and international firms, are now creating complicated supply networks.

059-0055 Managing risks in a multi-tier supply chain

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Sushil Kumar, Professor, Indian Institute of Management Lucknow, India
Omkarprasad S Vaidya, Assistant Professor, Indian Institute of Management Lucknow, India

Risk management is a crucial challenge for supply chain managers. A firm faces risks from all upstream and downstream supply chain stakeholders. Therefore, an end-to-end risk management approach is needed to fortify the entire supply chain network of any firm. In this paper, we explore the developments in the multi-tier supply chain risk management problem. As a representative case, we present a 4-tier supply chain comprising of suppliers, manufacturers, retailers and consumers. Each supply chain stakeholder is assumed to have two objectives: first to maximize profit, and, second to minimize risks associated with its economic transactions. The resulting individual tier-optimization problems are generally non-linear in nature. The network optimization problem can be derived from these tier-optimizations problems, using variational inequalities. The network optimization problem thus, represent the equilibrium state of the entire supply chain network. A computational procedure that exploits the network structure of the problem is proposed. At equilibrium, production outputs, inventory levels, product prices, risks, and various costs can be calculated and compared over a certain time period. The contribution of this paper is two-fold: First, a comprehensive introduction to the multi-tier supply chain risk management problem is provided. Second, structure of the problem formulation, along with the solution approach is proposed.

059-0086 Enhancing Competitiveness through Direct Dispatch - A case study

Vivekanand Khanapuri, Professor, National Instituteof Industrial Engineering, Mumbai, India
Shalini Chandel, Student, National Instituteof Industrial Engineering, Mumbai, India

Purpose: In a highly competitive environment, companies manufacturing locations are decided to leverage the advantages (tax holidays) which leads increased logistic costs. To overcome secondary manufacturing site or packing station are set up which does minor value addition to avail the tax benefits. However, there is need to reduce the total cost of transportation (Primary freight + Secondary Freight) and thus feasibility of adopting direct dispatch model is explored.Methodology : The key enablers for Direct Dispatch model have been studied for the FMCG sector. To establish the direct dispatch, one of states with highest sales for the product group identified, a distribution model is developed and an optimal set of distributors identified along with an estimate of freight savings. Direct Dispatch Model is replicated for other product categories and geographical regions where it is feasible.Findings:The key enablers identified for direct dispatch are; distributed manufacturing in multiple states, dispatch of minimum order quantity in Full Truck Load (FTL) and low shelf life of the products. The direct dispatch model for one of the high sales value product for intra state dispatch resulted in considerable savings of freight cost along with reduction in the requirement of the warehouse space. However, similar analysis for inter-state did not result in similar benefits.Conclusion : Competitiveness can be enhanced by considering the different aspects and for the case under consideration, freight cost and warehouse cost can be brought down by adopting direct dispatch for the select set of product .A major savings of 33% was observed in primary freight as a result of direct dispatch

21

Saturday, 02:30 PM - 04:00 PM, Room 12A *Track:* SUSTAINABILITY IN OPERATIONS

Session: SUSOP 2

Chair(s): Anju Singh

059-0071 A study of inter-organizational collaborations for sustainable performance through e-waste management

Pranoti Pokale, Student, Indian Institute of Technology Bombay, India

Green manufacturing firms and their supply chain partners are keen on developing ccollaborative behaviors with upstream and downstream partners are important in creating an environmentally sustainable supply chain. Research suggests that despite the popularity and benefits of inter-organizational relationships, not all of the evidence is positive. Many inter-organizational relationships fall short of meeting the expectations of their participants. In case of reverse supply chain management, coordination is far more important as the reverse flows emanate from the customers, it is almost completely uncertain and difficult to forecast. Also, it has imperfect product and packaging quality, many-to-one transportation, unclear disposal options, differences in nature and visibility of costs and decreasing time value of product. In this proposed doctoral research, we study the implications of inter-organizational collaboration on sustainable performance in the context of reverse supply chain management. A inter-organizational collaborations in supply chain management are the activities that require varying degrees of interaction with other organizations in the supply chain consisting of suppliers, retailers, customers, third party service providers, alliance partners and competitors. We focus on forms of collaboration depending upon the basis of the relationships undertaken by dedicated electrical and electronics firms and assess the contribution of cooperative ventures to sustainability. Achieving the social, environmental and economic benefits of triple bottom line are the key measures to evaluate the sustainability performance of the firm. We seek to map the inter-organizational arrangements of exemplars for sustainable operations of this emerging industry using case study methodology and explain the purposes served which is important in understanding the consequences of such relationships. Identification of the patterns of inter-organizational collaborations of reverse supply chain can help managers allocate the limited resources they have towards management of those parts of the supply chain that are having the greatest impact on a firm's sustainable performance.

059-0070 Sustainable Waste Management: A Case Study of Cement Industry

priyanka pathak, Student, MALVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR, India

Govind Dangayach, Professor, MALVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR, India
Sumit Gupta, Student, MNIT JAIPUR, India

Sustainability means meeting the needs of the present without compromising the ability of future generations to meet their own needs, and Sustainable Waste Management is using waste produced efficiently so that use of amount of material resources get reduced. India, is the second amongst cement producers in the world with a total capacity of 245.40 Million Tonnes (MT), has a huge cement industry and produces about 7% of world's total production. The Indian cement industry has on one hand, enormous pressure to increase profit and margins, while on other; there is considerable public interest on a sustainable and environment friendly usage of natural resources. The objective of this paper is to pursue sustainable waste management for a cement industry through replacement of coal with some alternative fuel, which actually belongs to the group of hazardous wastes and which could benefit the plant economically and environmentally, and improve sustainability of plant. The use of alternative fuels will help in reducing energy costs and providing a competitive edge for a cement plant. Furthermore, this will reduce the burden of waste disposal considerably. So, it also supports to fulfilling Sustainable Waste Management issues.

059-0012 Design for the Environment: Impact of regulatory policies on green product development

Sirish Gouda, Student, Indian Institute of Management Bangalore, India
Sreelata Jonnalagedda, Assistant Professor, Indian Institute of Management Bangalore, India
Haritha Saranga, Associate Professor, Indian Institute of Management Bangalore, India

Automakers world over are facing pressure from their stakeholders to not only follow sustainable business practices but also produce products that are less harmful for the environment as well as the society at large. However, the presence of stringent regulatory constraints makes it difficult for a few firms to operate in some markets. In this paper, we propose an alternative regulatory mechanism and demonstrate the impact of a composite emission regulation on the total environmental quality and also on the profitability of the firm in few specific business scenarios. We show that a composite standard would benefit the environment as well as the automakers by encouraging fuel-efficient cars and environment friendly cars thus leading to a better triple bottom line (economic, social and environmental performance) under some conditions. We also demonstrate how economies of scale and synergies play a role in determining the choice of product made available by the manufacturer.

059-0134 Investigating and Securing Pharmaceutical Supply Chain: An Anti-Counterfeit Structure

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nitin vihari , Student, Indian Institute of Technology Roorkee, India
M. K. Barua, Assistant Professor, Indian Institute of Technology Roorkee, India

The intricacy of the Indian health care services structure is expanding quickly. Demographic progressions, alongside an assembly of new medications, are bringing on more noteworthy volumes of counterfeited drugs and completed items to travel through the pharmaceutical production network. Since medications are in excess, there is unfailingly probability of counterfeit. A few late instances of fake solutions have raised Indian familiarity with the issue. Data is a powerful device to battle fake, then again, new production network structures and connections will need to develop to sort out and trade data. Delivery of these new drugs to the right group of people presents a challenge that the current logistical system cannot handle effectively. Advanced track and trace systems, currently being researched will lay the foundation for the management of this not-to-distant complexity and provides the framework for a safer and securer Supply Chain. The agenda here is to securing the entire supply chain with keen strategic efforts in terms of information security. This paper examines emerging issue of counterfeit and the legal underpinnings for improved trace and trace capabilities within the pharmaceutical supply chain.

059-0137 Stakeholder Pressure and the Implementation of Sustainable Supply Chain Management Practices: the role of Proc

Suresh Jakhar, Assistant Professor, Indian Institute of Management Rohtak, India
Damodar Golhar, Professor, Western Michigan University, United States
Manoj Hudnurkar, Associate Professor, SCMHRD Pune, India

This empirical study explores the relationship between stakeholder pressure (SP), process management practices (PMP), innovation capabilities (IC) and sustainable supply chain management practices (SSCMP). Drawing on the theoretical foundations of resource based view (RBV), resource advantage theory (R-A), institutional theory and stakeholder theory, research hypotheses have been developed. To test the developed hypotheses, measurement scales for SP, PMP, IC and SSCMP are developed and validated by using empirical data from Indian automobile industry. The findings support the relationship between RBV, R-A, institutional theory and stakeholder theory and institutional theory. Further, we examine whether SP, PMP and IC become enablers or hinderers in the implementation of SSCMP.

22

Saturday, 02:30 PM - 04:00 PM, Room 14 *Track:* SUPPLY CHAIN AND LOGISTICS MANAGEMENT

Session: SCM 5

Chair(s): Padmanav Acharya

059-0061 Supply Chain Networks with Externalities in Emerging Economies

Omkar Palsule-Desai, Assistant Professor, Indian Institute of Management Indore, India

Network stability eliminating incentives for competing farmers to alter the existing network structure is essential for network competitiveness and sustainability. Appropriately allocating joint costs/benefits of network externalities among the network farmers is important when the farmers exercise individual rights in own interests by engaging with a coordinator that gathers (net) benefits for the entire network. The existing studies focusing on network externalities examine their implications for players' performances; however, they do not adequately capture issues related network stability. In this paper, we develop a (noncooperative) game theoretic model for a particular network setting wherein fringe farmers compete with a two-tier supply chain network involving network farmers and a coordinator. We consider indirect network externalities on the supply side and examine the role of the coordinator and profit sharing in allocating costs/benefits of externalities in enhancing network competitiveness and stability. The motivation for our work particularly comes from recent developments in fruits and vegetables supply chains in emerging economies such as India. We provide structural results characterizing network competitiveness and stability and obtain bounds for the model parameters reflecting (i) network externalities, (ii) level of competition, and (iii) profit sharing. While the coordinator can shut the fringe farmers out of the market under certain situations, there also exist situations in which the network farmers are not active. In this regard, we determine the optimal number of farmers ensuring active participation of the network farmers in the market. We show that the network is efficient without explicit cooperation among the network farmers whenever they are active, and using the profit sharing based mechanism the coordinator can obtain a stable network that is also efficient. Moreover, we show that the role of both coordinator and profit sharing becomes particularly critical when both network and fringe farmers are active in the market.

059-0087 Supply Network Design for Manufacturing Industry

Pranav Rajvanshy, , ,
Vivekanand Khanapuri, Professor, National Instituteof Industrial Engineering, Mumbai, India

PurposeSupply chain is a key strategy area in manufacturing, FMCG, retail, logistics and other sectors. An efficient supply chain is not only fast in responding to market dynamics but also extracts cost redundancies out of business. Companies incur substantial costs in form of COGS at various stages of value chain starting from raw material procurement to delivery of Finished Goods to distributors. This could be as high as 80%-90% of overall revenue thus a prime area for cost optimization This paper attempts designing a cost effective and responsive supply network of vendors, factories, warehouses and distributors in manufacturing / FMCG sector.MethodologyA comprehensive quantitative approach (using Operations Research model) to design a supply network, which minimizes the overall cost of serving the distributors is developed. Key cost elements that have been considered include procurement costs, manufacturing costs, warehousing costs, and finished goods distribution costs. Additionally, emphasis has been also laid on identifying direct dispatch potential. This model can, however, be easily scaled up for real life situations and also be expanded to find out cost-optimal green-field factory and warehouse locations. However; to build the basic concept of efficient design such scenarios are out of scope of current study.FindingsThe approach comes up with a supply network that serves the customers at minimum cost. Key deliverables include cost optimal production schedules at factories; primary and secondary freight lanes selection and dispatch schedules (quantity and frequency) from factories to either warehouses or distributors.ConclusionAn efficient supply network gives the company an enduring competitive advantage in terms of cost to serve and service levels. The study reflects in quantitative terms the benefits that could accrue by redesigning the product flow across the supply network.

059-0098 MANUFACTURING CHALLENGES FOR SMEs

Kunwar Kushagra Murti Singh, , ,
Akash Gyan, , ,
Vivekanand Khanapuri, Professor, National Instituteof Industrial Engineering, Mumbai, India

Purpose : Small and medium enterprises (SMEs) are the backbone of the Indian economy. These SMEs are involved in all the sectors of economy viz. agriculture, manufacturing, service etc. SMEs provide employment to over 40% of Indian workforce but contribute a mere 17% in GDP. The country's 1.3 million SMEs account for 40% of India's total exports. However, the main concern is that SMEs in India, due to their low scale and poor adoption of technology, have very poor productivity. Also, as per the survey, mortality of small businesses is quiet high in the first two year of existence. Considering the contribution made by SME, and further, the impetus given in the national manufacturing policy, the share of manufacturing in GDP is expected to reach 25% within a decade and create 100 million jobs. But as reflected in the “National strategy for manufacturing”, there is need to address the issues faced by the Small and Medium Enterprises in their development. Methodology/Approach: To address the growing concern, the article focuses on challenges in SMEs related to manufacturing sector. Primary data is proposed to be collected by adopting a purposive sampling of SMEs located in two industrial area (MIDC) of Mumbai to study the challenges related to the operation and planning strategy. The main areas of study will be the adoption of techniques related to; Management of Inventory, Manufacturing Planning and Scheduling techniques, adoption of technology for enhancing the productivity along with Focus on Automation & use of green technology. Findings: On the basis of primary data collected from various SMEs a strategy/framework will be proposed which a SME can enhance productivity by using new & improved technology and thus be competitive in the market and sustain its growth in the evolving manufacturing sector of India

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059-0128 An Interpretive Structure Model Approach to supply chain flexibility: A Case study of Indian FMCG firm

Rohit Singh, Student, ABV-IIITM Gwalior, India
Padmanav Acharya, Associate Professor, National Instituteof Industrial Engineering, Mumbai, India

Abstract- The current business environment is becoming increasingly uncertain, unpredictable and turbulent. Organizations always keep themselves ready to face any eventuality. Flexibility is one of the ways to cope up with uncertainty. Supply chain flexibility refers to the ability to change the supply chain system as per the current business need. The purpose of this paper is to identify dimensions of supply chain flexibility, fit in the environment of Indian FMCG firm. Dimensions of supply chain flexibility are extracted from extant literature. A field survey was conducted to interview experts of the case firm and then a questionnaire survey was carried out to collect responses. Total 23 senior and middle level managers participated in the interview session to give their valuable insights and same no. of executives participated in questionnaire survey. The data collected from case firm was used as an input to develop the interpretive structural model (ISM). In this study 22 dimensions of supply chain flexibility are extracted from literature.

059-0009 Supply Chain Management Practices in the Textile and Apparel Industry

Jin Su, Associate Professor, Indiana University of Pennsylvania, United States
Vidyaranya Gargeya, Professor, University of North Carolina Greensboro, United States

Effectively managing the global textile and apparel supply chain becomes a key strategic consideration for firms to sustain or improve their competitiveness. The purpose of this paper is to investigate global supply chain management practices from textile and apparel industry’s perspectives under the current complex and competitive global textile and apparel market environment. Based on an empirical study of firms in the U.S. textile and apparel industry, the results demonstrate the changing supply market, the need for supplier evaluation systems, strategic sourcing practices, supplier selection practices, and the effects of strategic sourcing, supplier selection, and supplier evaluation systems on buyer firm’s competitive position. Survey results show overall strategic sourcing practices, supplier evaluation systems, and supplier selection practices impact buyer firm’s competitiveness in the marketplace. Suggestions for future research are presented in the paper.

Sunday, 09:30 AM - 11:00 AM

25

Sunday, 09:30 AM - 11:00 AM, Room 11 *Track:* MANUFACTURING OPERATIONS

Session: MNOP 1

Chair(s): Milind Akarte

059-0034 LEAN SIX SIGMA IMPLEMENTATION: AN ANALYTIC HIERARCHY PROCESS APPROACH

Sanjay Kumar, Professor, , International Institute of Technology and Management, Murthal, India
Sunil Luthra, Lecturer, Department of Mechanical Engineering, Government Polytechnic, Jhajjar, India
Abid Haleem, Professor, Faculty of Engineering and Technology, Jamia Millia Islamia, New Delhi, India
Dixit Garg, Professor, National Institute of Technology, Kurukshetra, Haryana, India

'Reduction of waste' has been key theme of 'lean' concept implementation in manufacturing, process and up to some extent in service sectors of industries; however, 'six-sigma' concept implementation focuses upon 'quality improvement techniques' in production and delivery of products/services. 'Lean six-sigma (LSS)' concept combines tools and technique of 'lean' and 'six-sigma' towards achieving enhanced benefits to gain competitive advantage. Implementation of LSS concept has been emphasized in this paper by addressing identification of appropriate enablers and ranking of these enablers. Literature review and subsequent discussions with experts enabled to: identify; sort and combine; and finalize twelve enablers important to implement 'lean six-sigma' concept. Analytical hierarchy process (AHP) has been used to rank identified LSS enablers by utilizing experts' opinions. 'Management involvement and funds allocation' has been rated as top ranked enabler to implement LSS concept. Decision making authorities may be benefitted in dealing with planning and implementation of 'lean six-sigma' concept in manufacturing and service sectors.

059-0027 Dynamic Mizusumashis - Development of a hybrid part feeding model for Cellular Manufacturing

Gandreti Leela Krishna, Student, National Institute of Industrial Engineering, India
Mukundan R, Assistant Professor, National Institute of Industrial Engineering, India

The present manufacturing scenario seeks for improvement of an enterprise's existing processes and activities such as integration of design phases with production and related supply chain activities. Cellular Manufacturing and lean production philosophies have paved the way in achieving operational efficiencies and stand out in a competitive environment. Cellular layouts, facilitated by supermarkets (decentralized warehouses in shop floors) and Mizusumashis(part feeders)for their smooth operations face challenges in effective executing of operations like material feeding process.. The objective of this work is to model the movement of parts from super markets to cellular workstations with an objective to minimize line stoppages and excessive WIPs at cellular work stations. Such a model we hope would lead to through standardized material/part feeding process. Three conventional methods -Kitting, Kanban System and Line Stocking are taken as references and each method is analyzed with relevance to the study objective. The relevant methodsare analyzed to create a standardized feeding process in terms of optimal number of containers, frequency of feeding in a shift. A dynamic feeding route for the mizusumashis with different material handling facilities is also modeled that takes into account for the variations in demand for a particular cell.A hybrid part feeding policy is thus proposed which makes the manufacturing cells efficient in terms of balancing WIPs by reducing the variability in feeding and WIPs at the work stations.

059-0125 A framework for "Lean" Implementation

Saidep Rathnam, Research Associate, Indian Institute of Management Bangalore, India
Krishna Sundar Diatha, Professor, Indian Institute of Management Bangalore, India

Various aspects such as organizational culture and its impact on business results, the role of senior managers and middle managers in bringing about change (not necessarily in the lean context) and the role of Community practice in the context of knowledge management have been studied separately. "Lean" has many counter intuitive concepts; their acceptance by the organization to the extent of modifying its culture plays an important role in success of lean implementation. Senior managers and middle managers need to deploy both transformational and transactional approaches during lean implementation. How significant is the role of cultural modification in ensuring a lasting transformation? Which is the most effective style in each of the phases of lean transformation? Community practice as a knowledge 'management' technique has been studied but how does it help in scaling up the implementation of these counterintuitive concepts across the company/companies? This paper proposes to link these elements into a model which would help a CEO to implement "lean" smoothly and effectively, rather than using trial and error methods.

059-0100 The Impact of Costs on Optimal Capacity Acquisition under Demand Uncertainty

J. Prince Vijai, Student, IBS, Hyderabad, India

We consider a firm that offers two products to serve the local market using two dedicated resources and one flexible resource. We model the firm's capacity acquisition decision as a two-stage stochastic optimization problem with recourse. In the first stage, the firm determines the capacity acquisition level before realization of products demand. Whereas, in the second stage, after the products demand is realized, the firm determines the production allocation level. Our objective is to study the impact of both strategic and operational cost parameters on optimal capacity acquisition decision. We conduct post-optimality sensitivity analysis to cost parameters and found interestingly that the firm's processing network exhibits both complementarity as well as substitution effects. We discuss our results and implications in detail.

26

Sunday, 09:30 AM - 11:00 AM, Room 12 *Track:* OPERATIONS MANAGMENT PRACTISE

Session: OMP 1

Chair(s): Sanjay Ahire

059-0106 Analysing the Interactions of Operation Strategy Elements and its' Strategic Reconciliation: A Case of Chilika

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Sanat Panda, Excise Officer, Directorate of Central Excise Intelligence, India

The Chilika Lagoon is situated on the east-coast of India, the largest brackish Water Lagoon with estuarine character. It is the largest wintering ground for migratory waterfowl found anywhere on the Indian sub-continent. Presently, Chilika ecosystem had been encountering a number of problem and threat like - siltation, shrinkage of water spread area, choking of the inlet channel as well as shifting of the mouth connecting to the sea, decrease in salinity and fishery resources, proliferation of fresh water invasive species due to decrease in salinity. The study was conducted to find the operational strategy of a governmental organisation i.e. Chilika Development Authority (CDA), focused for social and ecological upliftment and to find gaps against the present operation of CDA. This study uses the framework of Operations Strategy Matrix to see the operation strategy required against the mission and vision of the Chilika Development Authority and studies and analyse the present operation for identification of the gaps. Primary data and secondary information have been collected for this purpose. The case study identifies that CDA among others lacks in the strategic operational decision areas of capacity building and strengthening of the development and organisation, required for a knowledge-based organisation with the teeth required for implementing the action plan to impact the environmental and societal changes with growth objectives.

059-0065 PROCESS SELECTION FOR IMPLEMENTING LEAN THINKING: AN AHP APPLICATION

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Anand Gurumurthy, Associate Professor, Indian Institute of Management Kozhikode, India

Purpose - Appropriate process selection plays a key role in successful implementation of Lean Thinking (LT) in an organization. Review of literature revealed that the problem of selecting a suitable process for pilot implementation of LT is given least importance although a significant amount of work describes various case studies that deal with either direct implementation or assessment. Hence, in this current study, an "8A Framework" is proposed with factors and sub-factors that need to be evaluated while selecting a process for implementing LT. Design/Methodology/Approach - The main factors and sub factors of 8A framework were identified by reviewing the existing relevant literature. Since, process selection involved multiple factors, Analytic Hierarchy Process (AHP) is utilised to perform multi-attribute decision making. Single case study approach has been utilized to demonstrate the decision making model and sensitivity analysis has been conducted to assess the robustness of the results.Findings - 8A framework developed assisted the case organization in the selection of a process from the available alternatives. Sensitivity analysis indicated no changes in the process selection decision even after changing the weights significantly till a threshold value, thereby indicating that the decision was consistent and robust.Research limitations/implications - 8A model developed in this study is only validated in a single case organization. Hence, they have to be validated by collecting data through a survey for generalizing the model developed.Practical implications - Process selection decision making model developed is believed to help practitioners in taking informed decision on lean implementation which involves huge resource allocation, and heavy investments that often tends to be irreversible.Originality/value - Contributes to the literature of LT by providing the factors to be considered and suggesting a decision making procedure to be followed for selecting a process before implementing LT.

059-0058 Optimization of Labour Productivity Using MOST Technique

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Govind Dangayach, Professor, Malaviya National Institute of Technology, India
Sumit Gupta, Student, Malaviya National institute of Technology, India

Productivity has now become an everyday watch word. The most practical approach is to attack the work process itself- that is, review and redesign the operations and apply automation and mechanization. In such cases, a productivity audit employing industrial engineering (IE) techniques is used for evaluating the existing manufacturing situation and identifying the potential for increased productivity. MOST (Maynard Operation Sequence Technique) is a good application of work measurement technique that allows a greater variety of work (both repetitive and non-repetitive) for manufacturing, engineering to administrative service activities to be measured quickly with ease and accuracy. This paper demonstrates the application of MOST technique through a case study of process improvement for improving labor productivity. This paper attempts to show the application of the MOST for time study of casting processes at bathroom appliances industry and shows the comparison with the time standard established using Stopwatch method. Statistical t-test is used to show the significance level between stopwatch method and MOST results. Test shows a 95% level of confidence in the result obtained using MOST.

059-0108 Usefulness of service learning in teaching operations management

Sriram Narayanan, Associate Professor, Michigan State University, United States
Ram Narasimhan, Professor, Michigan State University, United States

A number of scholars have enumerated the usefulness of service learning in teaching business courses, particularly operations management. In this study, we perform a systematic examination of the effectiveness of service learning. In a study setting where one group of students learnt operations management concepts through service learning and another group did not pursue service learning, we examine the knowledge, skill and ability of student's pre- and post-course. In addition, we also examine the student's awareness of different concepts they learnt in course relating to operations management and their respective increases. Our study has implications for understanding the effectiveness of service learning and its relative usefulness, in comparison to other approaches pursued in teaching the course. In the light of our results, we discuss the benefits and disadvantages of pursuing service learning.

059-0010 Building POM Relevance from Group Up - The Global Supply Chain & Operations Management (GSCOM) Model of Holist

Sanjay Ahire, Professor, University of South Carolina, United States
John Jensen, Professor, University of South Carolina, United States
Manoj Malhotra, Professor, University of South Carolina, United States

Even as POM researchers strive to conduct research relevant to practice, practitioners are reluctant to engage in abstract, longer-term research with academics. Everywhere, broader stakeholders such as legislatures and general public as well as employers seek immediate and concrete return on investment in higher education in terms of employable graduates who can contribute to the bottom-line and top-line performance of their employer organizations in any sector. At the University of South Carolina - Moore School of Business, POM faculty undertook a clean-slate approach to developing a unique model that triangulated between industrial outreach, academic curriculum design, and applied research. This process resulted in the launch of a global supply chain & operations management program (undergraduate and MBA) in 2006. Over the last eight years, the program and its associated initiatives have created unexpected competencies for our graduates, and resulted in 150 high-value strategic and operational consulting projects for many leading global organizations across multiple sectors such as Carolinas Healthcare System, Coca Cola Bottling, Colonial Life, Cummins, Eaton, Johnson & Johnson, Mead Westvaco, Palmetto Health, Pfizer, PwC, Trane-Ingersoll Rand, Siemens, Sonoco, Wal-Mart, and Westinghouse. We will present the architecture of the program, the strategic process, the cultivation of the self-propagating companion applied research/consulting center - the USC-Global Supply Chain & Process Management (USC-GSCPM) Center, and the unique industry-validated lean six-sigma green belt certification program as a part of the holistic Academic-Industry collaboration with Fortune 500 industry partners from all over the United States. We will illustrate the salient outcomes from this initiative for graduates, industry partners, employers, and POM faculty. Critical success factors for replicating the model elsewhere will be discussed, including the urgent need to redefine the roles and capabilities of POM faculty to execute such initiatives and in turn increasing their own relevance.

27

Sunday, 09:30 AM - 11:00 AM, Room 12A *Track:* SERVICE OPERATIONS
Session: SVOP2
Chair(s): Usha Ramanathan

059-0066 Performance of Office-Based Versus Home-Based Call Center Agents: Evidence from three Industries in Korea

Nagesh Murthy, Associate Professor, University of Oregon, United States
Hyojeong Kim, Lecturer, University of Oregon, United States

Call centers are an important part of the Korean economy. Call center market in Korea is estimated at 2.5 billion dollars with an average growth rate of 7.8% (Korea Information Society Development Institute, 2010, p. 63). There are 2174 call centers in Korea with about 400,000 employees (CIRC, 2007). Globally, 71% of call center agents are 'women' (Holman et al., 2007). In Korea over 95% of call center agents are women. Work-life conflict, job stress, and low job satisfaction are major reasons than result in turnover for women call center agents. The average turnover rate for call centers in Korea is approximately 20%, and is much higher than national average across various industries (Lee et al, 2007). The managers focus their efforts on recruiting, training, and retaining call center agents. Providing call center agents the opportunity to work from home is being explored as a tool to enhance recruitment and retention. At the same time a major concern for managers is to understand the implications of adopting a pool of home-based call center agents on the productivity and service quality in call center operations. We develop an understanding of the theoretical underpinnings and examine the performance of call center agents that work from office vis-à-vis those that work from home. The home-based workers achieve significantly higher call productivity without any loss of call service quality. These differences are accentuated by task complexity and call routing clarity perceived by the agents.

059-0105 Service operations issues influencing the customers' satisfaction: A study of Indian wild-life tourist resort

Parikshit Charan, Assistant Professor, Indian Institute of Management Raipur, India
Sanat Panda, Excise Officer, Directorate of Central Excise Intelligence, India

In the tourism industry, wild-life tourism is a fast growing, attractive and high revenue and profit generating sector. As the service criteria becomes important with more customers' involvement in Service Delivery and more incidence of Service Encounters, the managerial role becomes vital to meet the customers' expectations and/or manage the customers' expectations that result in customers' satisfactions. The objective of the study is to find out select issues in service operations influencing the customers' satisfaction in an Indian wildlife resort which can be addressed to attract customers to wildlife destinations. The study was an exploratory research based on primary data collected through an instrument of Parsuraman on SERVQUAL to find out the Customers' expectations and perceptions of the Service. Further, by administering questionnaires to the employees, their skill levels and level of satisfaction have been measured. To gain further insight, informal interview of the manager of the resort under study, few customers and employees was conducted to understand the influencing issues in service operations. The study highlights the difference in perception and expectation of the holidaying customers and wild-lifers/photographers. The study emphasise the trade-off between kind of service operation a wild-life resort could focus and its effect on the customer satisfaction.

059-0131 Moderating effect of promotions in retail services: A critical view on role of operations

Usha Ramanathan, Senior Lecturer, University of Bedfordshire, United Kingdom
Nachiappan Subramanian, Associate Professor, Nottingham University , China
Guy Parrott, Senior Lecturer, University of Bedfordshire, United Kingdom

In 21st century, retail customers are loaded with different options to choose from. This jeopardises many retailers' and manufacturers' planning in production, logistics and distribution. In this research, we try to understand the role of different operations (such as store service quality and store convenience) and marketing (such as reviews and promotions) in retail customers' satisfaction. To support this research, we have collected retail customers' views on weekly grocery shopping experience with respect to various features such as loyalty schemes, services and price. We have conducted this survey in Southern regions of the UK. Based on the survey data we develop a structural equal model to verify the impact of elements of operations and marketing in shopping satisfaction of customers. We also test the moderating role of sales promotions in this particular relationship. The results of the analysis clearly specify the moderating role of different promotions in the relationship between service experience and satisfaction.

059-0048 Service Process Mapping and Mobile Workflow Solutions in the monitoring of Tuberculosis Treatment

Ravi Seethamraju, Associate Professor, The University of Sydney, Australia
Krishna Sundar Diatha, Professor, Indian Institute of Management Bangalore, India
Shashank Garg, CEO, Handheld Solutions & Research Labs, India

With over 20% of Tuberculosis (TB) case detected annually, India accounts for almost 1.4 million cases annually and incurs an economic burden of $3 billion per year. Early detection of TB and completion of specified treatment though cures the disease; non-completion leads to drug resistance and significant rise in treatment costs. Using a pen-and-paper system, a Government program called DOTS (Directly Observed Treatment Short-course), though monitors patients for adherence to the treatment strategy, it is neither scalable nor effective. This study, using semi-structured interviews of public health service professionals at various levels, analyses the service delivery process in the context of managing the DOTS program for TB control in regional India and identifies weaknesses and process disconnects across various levels of public health care touching this program and analyse the effectiveness of mobile-based workflow solution. It combines several key technologies - a mobile-based electronic form specially designed for this purpose, biometrics-based identify management enabled by the Government of India's 'Aadhaar' scheme, a service process delivery mapping that identifies the process disconnects, and a workflow solution that connects various levels of health care professionals, ASHA worker and patient. The study recommends a system of data collection and monitoring in real-time starting from patient registration at a health-care facility to the triggering of default in dosage to ASHA worker for further action, and, to the final completion of the treatment and aggregation of data for reporting. The findings of this study, will contribute identification of process disconnects in the public health service delivery process, and, delivery of reliable and accurate aggregated real-time data to health-care planners and governments.

28 Sunday, 09:30 AM - 11:00 AM, Room 14 *Track:* SUPPLY CHAIN AND LOGISTICS MANAGEMENT
Session: SCM2
Chair(s): sachin kamble

059-0122 Influence of market share and information asymmetry on supply contracts for a single supplier multiple

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Balram Avittathur, Professor, Indian Institute of Management Calcutta, India

Influence of market share of buyers on choice of contracts has not received sufficient attention in the context of various supply chain structure. This paper focuses on this gap and examines a network consisting of one supplier and two buyers under complete and partial decentralization. In the complete decentralized setting both buyers are independent of the supplier. In the partial decentralized setting the supplier and one of the buyers form a vertically integrated entity. Both buyers order from the single supplier and produce similar products to sell in the same market. The supplier charges the buyer based on a contract and the transfer price varies depending on the supply chain structure. We investigate the influence of supply chain structure, market-share and asymmetry of information on supplier's choice of contracts. We discuss two contract types namely quantity-discount and nonlinear two-part tariff contracts; we also examine wholesale price and linear two-part contract as special cases. We determine the cut-off policies by incorporating the reservation profit level of individual buyers. The managerial implications of the analyses are presented in the conclusion.

059-0075 Supply chain management in Newspaper Industry: A case of responsiveness

Shubham Sharma, Student, Gautam Buddha University, India

AbstractThe purpose of this paper is to assess the responsiveness of supply chain in newspaper industry at discrete events. Newspaper industry presents a different set of challenges and opportunities for implementing supply chain management initiatives. The paper focuses on a survey-based research that has sought to assess the responsiveness of supply chain at discrete events.Typically, a responsive supply chain is capable of meeting market demand and increased capability to provide/produce more at less cost in less time. Looking at the perishable nature of newspaper, the responsiveness assumes significance. Four key determinants-forecast uncertainty, demand variability, contribution margin, and timeof delivery are found suitable to assess the responsiveness of the newspaper supply chain.The methodology is based on literature review, field surveys, and interviews conducted at various stages in supply chain. The paper summarizes the observations based on survey/interviews conducted on various entities and events in the entire supply chain. It also explores various drivers responsible for adding value in the supply chain. Lastly, the responses by the survey respondents indicate that not enough resources were allocated to meet the desired responsive levels in supply chain.The results and insights derived will be useful for business managers to understand and implement supply chain plans in terms of responsiveness.Keywords: Supply chain management,Responsiveness,Discrete events, agility

059-0094 Loss Reduction and Cost Optimisation in Transportation

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Objective: The logistics cost in India is around 13-14% of the GDP which is staggeringly high as compared to the developed nations. On an average transportation constitutes around 35% of logistics cost and maverick expenses (including losses) contribute to around 30% of the end to end supply chain cost. Very high logistics cost and losses, lead to low profit margins. A framework is proposed to identify the processes involved in their logistics that could be optimized to reduce the overall cost considering the costs and losses. Methodology: A qualitative approach to develop framework to help firms strategically reduce their overall transportation cost. The transportation cost being discussed here refers to the expenses incurred in the physical movement and comprises- Line haul expenses, Terminal expenses, and Capital expenses. Organizations often focus on reducing the logistics expenditure without analysing the effect on losses and vice-versa. However, any method reducing loss may incur additional expenditure and methods to reduce expenses may augment losses. Hence, the ultimate aim is to devise a strategy that would reduce the overall cost. Proposed framework: A 2x2 matrix has been evolved which takes into consideration the Expenses on one axis and Losses on the other with an objective to identify strategies to reduce the overall cost. The approach can be Planned Expense Reduction or Risk Mitigation and Loss Reduction. Further, strategy adopted would primarily be based on type of goods being transported, dispatch source, receipt destination and related criteria. Techniques used to execute each strategy have been compiled. Conclusion: The proposed framework will thus help in highlighting the focus areas wherein limited resources could be rationally allocated for making existing supply chain more efficient and profitable. The strategy for each of the cases will provide guidelines to the companies in deciding a suitable set of action.

059-0132 Bullwhip Effect Analysis in Supply Chain of Consumer Goods under different Demand Forecasting Schemes

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This study focuses on quantification of the Bullwhip Effect (BWE) -the phenomenon in which information on demand is distorted in moving up a supply chain - for a simple two-echelon supply chain model with single distribution centre and ‘n’ retailers that follow an (R, S) inventory policy, in which the Inventory Position (IP) at each retailer is reviewed each day (R =1) and an order of a fixed batch size Qr is placed on the Distribution Centre (DC) to raise the IP to the desirable stock level, S. Assuming that the retailer employs an order-up-to level policy under different forecasting schemes, such as moving average (MA), exponential weighted moving average (EWMA) method and auto-regressive process (AR), the paper investigates the influence of forecasting methods on bullwhip effect . Determining the order-up-to levels and the orders for the retailers’ demands in an isolated manner neglects the correlation of the demands and the relevant risk pooling effects associated with the network structure of the supply chains are disregarded. It is illustrated that the bullwhip effects are significantly reduced with consideration of potential correlation between the retailers’ demand. The study is illustrated by data from packaged (branded) and unpackaged (unbranded) consumer goods category. Inferences and ramifications are also drawn about pack-size, shipping and risk pooling across the supply chain in fast moving consumer goods.