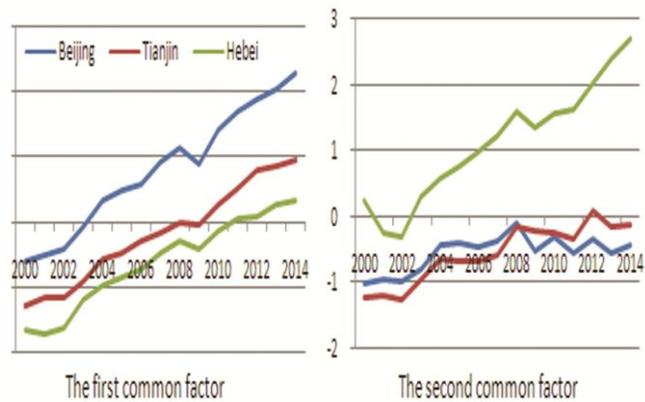


CONTENTS

Management & Information Technology

- 269 **Evaluation of Regional Industry Transfer Undertaking Ability Based on Sustainable Development** This study finds six factors which have a great influence on regional industry transfer undertaking ability: level of technical research and development, cost conditions, market potential, industrial supporting capacity, level of regional development, and environmental carrying capacity. The study collects the relevant data from 2000 to 2014 in the Jing-jin-ji Region and calculates the factor and comprehensive score of its industry transfer undertaking ability. The results show that the practice of evaluating these six factors can provide suggestions for the promotion of regional industry transfer.

Mei Feng, Kehui Yu & Rong Hao



- 273 **Industrial Cluster Development and its Contribution to Economic Growth in Taiwan - Hsinchu Science and Industrial Park (HSIP)** The development of industrial cluster plays a significant role in the growth of national industries, and the industrial cluster development indeed makes a great impact on the progression of national industries, especially in developing countries. Under the fiercely global trends in competition, industrial cluster has been identified as an important strategy to keep the development of regional industries in a sustainable trajectory, and a good implementation of industrial cluster usually reflects on the cluster region carrying within a large number of Small and Medium-Sized Enterprises (SMEs). Through the clustering of businesses and industries, the corresponding geographical proximity, and the promotion of mutual support and learning, businesses and industries located in the cluster region can further acquire the advantages of Economy of Scale and those of Economy of Scope. Meanwhile, the successful experience of Hsinchu Science and Industrial Park (HSIP) has become a good model for many countries to learn the development of Science Park, and the most contribution of HSIP is transforming the labour-intensive industries to talent-intensive industries. Also, it directly promotes the development of high-technology industries in a sustainable trajectory. Most important of all, the success of HSIP created the so-called “Taiwan Economic Miracle” in the later twentieth century, and it led Taiwan to be one of “Four Asian Tigers”.
- S J Lee, Grace T R Lin & P H Hsi

CONTENTS

279 **Stochastic Multifacility Location Problem under Circular Area Constraint with Euclidean Norm**

A K Santra

This investigation is the stochastic version of our previous work in which it is required to find the locations of a number of new facilities in a prescribed circular area constraint around the centre of gravity of a given number of existing facilities where the weights considered in the objective function are the random variables with discrete probabilities and the distance between the facilities is Euclidean. It has been assumed that the existing facilities are of one kind and the new facilities are of different kind with interactions between existing and new facilities as well as amongst new facilities. The stochastic multifacility location problem with circular area constraint has been formulated and solved by using *Kuhn-Tucker* conditions. A numerical example has also been solved by using the proposed method. Thus the outcome of the present work is a new method of finding the solution of a constrained stochastic multifacility location problem where the existing facilities are of one kind and the new facilities are of different kind.

284 **Strategic Product Innovations and Dynamic Pricing Models in Oligopolistic Market**

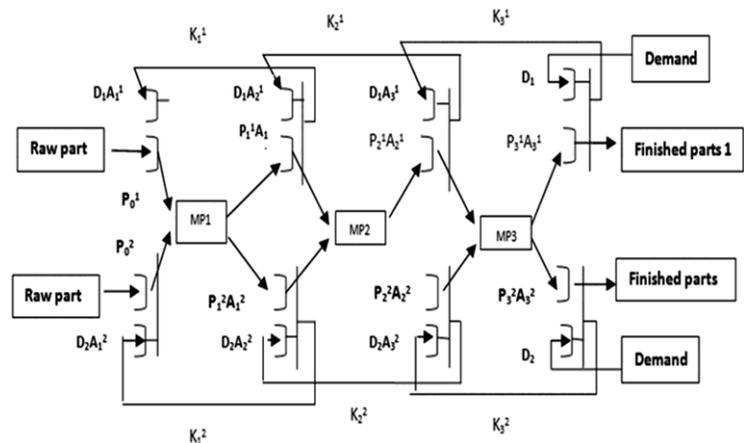
Min-Ren Yan

Product innovations are one of the most critical driving forces for business developments and competitive advantages. However, commercialization of innovations and a proper pricing strategy for the innovative products is needed to pursue the market value as well as the premium profits. A firm's pricing decision is regarded as one of the most business challenges in a competitive market, especially in dual competition and oligopolistic market. Although previous studies have addressed the tactics of price competition with diverse models, there is a need for systematic analyses regarding the dynamic price competition and a firm's strategic decision for innovative products. In this paper, System Dynamics (SD) methodology was adopted to propose a simulation-based Strategy Dynamics Pricing Model (SDPM) as a decision support system. Through iterative computer simulations, the impact of product innovations and the dynamic price competition in oligopolistic market could be systematically analyzed. Strategic pricing decisions for product innovations and market competition would be enhanced with the analysis for better innovation management.

289 **Analysis of Single Flow Line Multi Stage Multi-Product Pull Control Systems**

G G Sastry & R Garg

The production control systems in industries become a significant prerequisite for its success. The pull control systems could be a systematic approach for the effectiveness of production systems. This paper covers the investigation and performance analysis of Constant Work in Process (CONWIP), Kanban Control System (KCS) and Extended Kanban Control System (EKCS) using real time industrial problem. The industry manufactures two gears of different diameters and the demand for each is 20 per day. The CONWIP, KCS and EKCS are modeled as network diagrams in MATLAB-SIMULINK and simulated. The performance of EKCS is optimal as compared to KCS and CONWIP. The EKCS was implemented for one month and the production is increased by 54%.



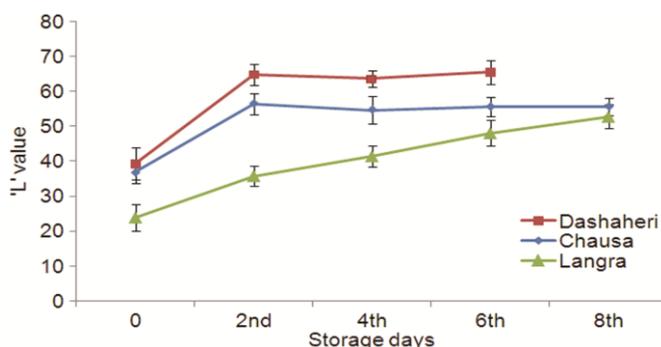
CONTENTS

S & T and Industrial Research

294 **Varietal Response of Exogenous Ethylene Application on Fruit Quality and Storage Life of Mango (*Mangifera indica* L.)**

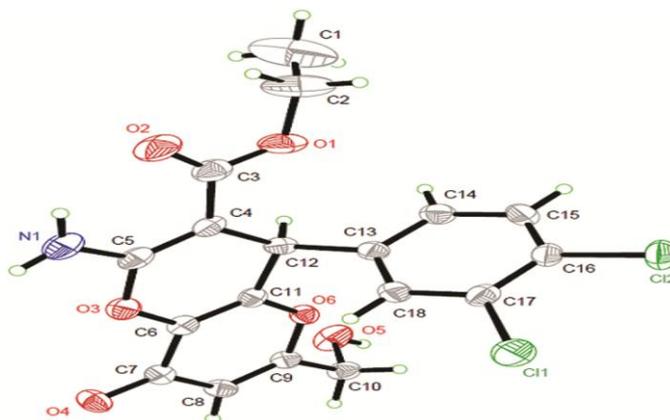
Physiologically mature freshly harvested Dashehari, Chausa and Langra mango fruits were subjected to 100 ppm ethylene dosing for 24 hours in a ripening chamber maintained with $24 \pm 2^\circ\text{C}$ temperatures, 95% relative humidity. After 48 hours holding in chamber, ripened fruits were taken out and stored at ambient condition ($25 \pm 2^\circ\text{C}$, $85 \pm 5\%$ RH) for 8 days. Dashehari reached to optimum soft eating stage on the 4th days after ethylene dosing. Chausa and Langra reached at optimum ripening stage on 6th day, while Dashehari spoiled and could not be stored further. Chausa and Langra lasted up to 8 days in storage, while their response to ethylene was found different. Ethylene evolution peak was observed maximum ($1.81 \mu\text{l C}_2\text{H}_4 \text{ kg}^{-1} \text{ h}^{-1}$) in Dashehari and lowest ($0.40 \mu\text{l C}_2\text{H}_4 \text{ kg}^{-1} \text{ h}^{-1}$) in Langra on 4th day of storage. Climacteric peak was declined on 8th day and lowest peak ($0.31 \mu\text{l C}_2\text{H}_4 \text{ kg}^{-1} \text{ h}^{-1}$) was noticed in Langra fruits closely followed by Chausa. Finally we found ethylene sensitivity of these three varieties as Dashehari < Chausa < Langra.

R Asrey, V R Sagar, K Kumar & S Sharma

299 **Synthesis of Dihydropyran Derivatives and Evaluation of their Antibacterial Activity**

As the persistent resistance of *Staphylococcus aureus* to available antibiotics is associated with high infection incidence, mortality rate and treatment cost, novel antibacterial agents with innovative therapeutic targets must be developed. Four novel pyran derivatives (1-4) were synthesized and characterized via IR, ^1H NMR, HRMS, and single crystal X-ray crystallography. The antibacterial activities of the four compounds were investigated against *Salmonella paratyphi* A and *Enterococcus faecalis* by MIC and MBC assay. It was found that compared with compounds 1 and 2, compounds 3 and 4 exerted rather potent activities against the two cell lines.

Wen-Jing Hao, Xiao-Yan Xu, Dai-Zun Zhang & Rui Han



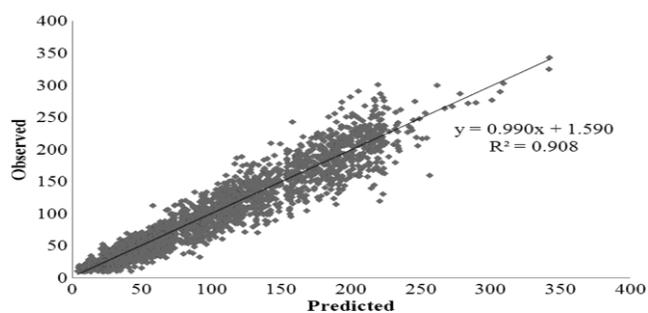
CONTENTS

- 303 Acrylate- α -Pinene Copolymer as Biodegradable Multifunctional Additives for Lube Oil**
 Copolymer of α -pinene (AP) with dodecyl acrylate (DDA) and myristyl acrylate (MA) were synthesized and characterized by spectral analysis (IR, NMR). Thermal stability was measured by thermogravimetric and average molecular weight by gel permeation chromatographic (GPC) analysis. Their performance as pour point depressant (PPD) and viscosity index improver (VII) was tested in two different base oils. DDA - AP copolymer showed better performance over MA - AP copolymer. In addition, introduction of α -pinene (AP) structure in the acrylate backbone has induced significant biodegradability in the copolymers. Homopolymers of dodecyl acrylate (HPDDA) and myristyl acrylate (HPMA) were also synthesized, characterized and evaluated in lube oils to make a comparison with their respective AP - copolymers.
 M Upadhyaya, P Ghosh & K Dey
-
- 308 Experimental Investigation of Misalignment and Looseness in Rotor Bearing System using Bartlett Power Spectral Density**
 This paper explains Bartlett Power Spectral Density (BPSD) based analysis to identify the faults in a rotor system from spectral density of vibration signal. Misaligned rotor increases vibration and generates abnormal forces at the coupling and transmitted the bearing. In this study, the dynamic response of a rotor bearing system with angular misalignment and looseness are investigated using the BPSD approach. The fault signals are then compared with baseline vibration signals. Angular misalignment was diagnosed from axial vibration and looseness from sub-harmonics signals at 1X, 1-1/2X, 2X, 2-1/2X, 3X.
 M Nataraj & G Baskaran
-
-
- 314 Multi-Objective Parametric Optimization for Non-Conventional Machining of Inconel 825 – for an Industrial Application**
 Inconel and titanium based alloys are hard, high temperature resistant and high strength materials finding wide application in aerospace, marine, food processing and nuclear industries. The conventional machining of these materials results in higher cutting forces and excessive tool wear. Wire cut electrical discharge machining (WEDM) being one of the popular non-conventional machining processes is used for macro and micro machining of hard and high strength materials. In this work, an experimental analysis and response surface modelling of WEDM process of Inconel 825 has been carried out. The surface roughness (Ra) and material removal rate (MRR) are two common performance parameters for accessing the ability of WEDM process. Pulse on time (Ton), pulse off time (Toff), peak current (Ip) and servo voltage (SV) are used as process parameters. Response surface methodology (RSM) modelling between inputs-output relationships has been obtained. The developed full quadratic model with R2 value of 92.06% and 95.62% for Ra and MRR respectively, produces less percentage error. The relationship between process responses and input factors are analyzed with 3D surface plots. The multi-objective optimization of non-conventional machining of Inconel 825 using genetic algorithm (GA) provides 21 Pareto-optimal fronts. An optimization table is generated for use in manufacturing industry for the production of components of desired surface roughness with maximum MRR.
 M Chandrasekaran, J George, R M Arunachalam & N Teyi

CONTENTS

Energy and Environment

-
- 320 **Developing Allometric Equations for Prediction of Total Standing Biomass of Pongamia pinnata L.: an important Biodiesel Plant**
- A study was conducted to develop allometric equations by destructive sampling of selected trees for prediction of biomass in Pongamia using easily measurable attributes (collar diameter, tree height, crown width and depth) and test the reliability of these relationships using an independent dataset from different management situations. Allometric models based on collar diameter, followed by crown width, showed better fit statistics as compared to the models based on other input variables. Crown depth has shown relatively weak link with the biomass parameters. Collar diameter was found to be the key driver in determining the biomass variables and number of branches. The results obtained with an independent data set validated the trained models.



G R Rao, B M K Raju, P Sathi Reddy & P Sharath Kumar

Author-Reader Platform

-
- 325 **Instructions to contributors**
-

CONTENTS

Author Index

A K Santra	279	N Teyi	314
B M K Raju	320	P Ghosh	303
Dai-Zun Zhang	299	P H Hsi	273
G Baskaran	308	P Sathi Reddy	320
G G Sastry	289	P Sharath Kumar	320
G R Rao	320	R Asrey	294
Grace T R Lin	273	R Garg	289
J George	314	R M Arunachalam	314
K Dey	303	Rong Hao	269
K Kumar	294	Rui Han	299
Kehui Yu	269	S J Lee	273
M Chandrasekaran	314	S Sharma	294
M Nataraj	308	V R Sagar	294
Mei Feng	269	Wen-Jing Hao	299
M Upadhyaya	303	Xiao-Yan Xu	299
Min-Ren Yan	284		

Keyword Index

Allometry	320	Misalignment	308
Antibacterial	299	MRR	314
Area Constraint	279	Multifacility	279
Average Waiting Time	289	Oligopoly	284
Bartlett Power Spectral Density	308	Optimality	279
Biomass	320	Optimization	314
Clustering Effect	273	<i>Pongamia pinnata L</i>	320
Collar Diameter	320	Pour Point Depressant	303
Competition	284	Pricing	284
CONWIP	289	Pyran	299
Crystal	299	Ripening, Quality, Storage Life	294
Decision Support	284	Rotor Bearing System	308
Demand Rate	289	Simulation	284
Destructive Sampling	320	Stochastic	279
EKCS	289	Strategy	284
Ethylene	294	Surface Roughness	314
Euclidean	279	Sustainable Development	269
Inconel 825	314	System Dynamics	284
Industry Transfer	269	Undertaking Ability	269
Kanban	289	Utilization	289
KCS	289	Vibration Signal Processing	308
Kuhn-Tucker Conditions	279	Viscosity Index Improver	303
Limitation	279	Viscosity Index Improver	303
Looseness	308	WEDM	314
Lube Oil Additive	303	WIP	289
Mango	294		