

PROCEEDINGS OF ARC2016 MULTIDISCIPLINARY INTERNATIONAL ACADEMIC RESEARCH CONFERENCE

February18-19th - 2016

Editor Kevin Smith Educational Consultant USA

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ARC 2016 WELCOME TO THE ANNA UNIVERSITY-PSGIM- ARC MULTIDISCIPLINARY INTERNATIONAL ACADEMIC RESEARCH CONFERENCE (MIARC - 2016)

KEY NOTE SPEAKER



Prof. M J Xavier obtained his Doctorate in Management from the Indian Institute of Management, Calcutta in the year 1984. He has been a teacher, trainer and consultant for close to 30 years. He has authored three books and published more than 100 articles in Journals and Magazines in India and Abroad. His book 'Marketing in the New Millennium' won the DMA-Escorts Award for the Best Management Book of the Year 1999. He has taught in premier Institutions like IIM Bangalore, XLRI Jamshedpur, IFMR Chennai, Great Lakes Institute of Management Chennai and IIM Ranchi. He has served as Visiting Faculty to a number of business schools in India and abroad including The University of Buckingham, U.K., Post Graduate Institute of Management, Sri Lanka, American university of Armenia in Armenia, The Texas Christian University, U.S.A., California Polytechnic State University, U.S.A. and S P Jain Institute of Management, Singapore and Dubai. He is currently serving as the Pro Vice Chancellor of Karunya University. His research interests include CRM, market analytics, strategic marketing and spirituality. He is a recipient of more than 10 awards for academic excellence & leadership.

SPECIAL ADDRESS



Dr. Ravichandran Krishnamurthy Associate professor and Director of Experiential Learning, New York Institute of technology, Abudhabi Campus, UAE

An astute & result oriented professional with over 22 years of extensive experience in operations, business development, academics and institution building. Currently employed as Associate Professor and Director of Experiential Learning, New York Institute of technology, Abudhabi Campus, UAE.

He holds the Post doctoral fellowship from University Kebangsaan Malaysia and Ph.D. in Finance from the University of Madras, India. His area of expertise is primarily with corporate finance and conducts focused research in the Behavioral finance and company analysis. He has co- authored several text books in Finance which are mainly focused on Indian markets. He made intellectual contributions that impact on the academic community in the area of corporate and Behavioral fiancé through papers published in competitive journals in this domain space (Finance India, Journal of investment, Money and Banking, International Journal of Economics and Finance...). He has also made contributions through service to the academic community, as recognition of his scholarship, through her inclusion as a reviewer and/or discussant for several academic conferences and also acting as an Editor of an International Journal. His research in the field of finance also resulted in contribution to teaching and learning by way of the receipt of a NYIT ISRC grant award. His Intellectual contributions have furthered higher education initiatives through his continued collaborative experiential education work with students into the annual Corporate Challenge Competition. His Intellectual contributions, by way of facultymentored student research projects were presented by students at International conferences and also got published International journals.

FOREWORD



Dr. RaedElzenaty, DDS, MBA Director of Institutional Research & Assessment New York Institute of Technology Abu Dhabi Campus, UAE

It is a great pleasure to be invited to the **Multidisciplinary International Academic Research Conference (MIARC - 2016)**, and a privilege to write this forward.

It is a wonderful thing to encourage and broaden the realm of academic research to today's world, and an even better thing to bring academics and researchers together in the common bond of academic research and development. The exchange of ideas and discussion of viewpoints is not only precious but a necessary rung in the ladder to achieving global education initiatives.

It is my hope that the two days of the **Multidisciplinary International Academic Research Conference** will encourage us all and enable us to bring home the motivation to spread among our peers and students.

Sincerely,

Dr. RaedElzenaty, DDS, MBA

FOREWORD



Dr. K. PrakashVel, Associate Professor, University of Wollongong in Dubai.

It gives me immense pleasure in writing a foreword to the 'MULTIDISCIPLINARY INTERNATIONAL ACADEMIC RESEARCH CONFERENCE - ANNA UNIVERSITY-PSGIM-ARC 2016 at Coimbatore, India, during February 18-19th, 2016.

ARC is a forerunner in creating and exchanging knowledge in the field of Business Management featuring major developments in the global economy and markets. They have been successful in organizing conferences to exchange skills and acumen on theory and practice on current and emerging management principles, ideas, concepts and research methods facilitating analysis among academicians, scholars and students, both at the post graduate and doctoral levels. I strongly believe that the conference would not only inspire the delegates participating from different parts of the World, but also further add to the existing literature in different research domains in business Management.

I am positive that the two days International Conference would be beneficial to the participants. I extend my sincere wishes for a successful conference.

Dr. K. PrakashVel

FOREWORD

Dr. G. Ananthapadmanabhan Professor (Former secretary –The Indian Econometric Society), Cambridge Institute of technology, Bangalore 560036.

This conference conducted during the winter session in India for the last few years has been in the forefront in attracting good number of papers of academic excellence and draws a larger participation from academics, corporate and policy makers. I feel it as a great privilege in writing this foreword to the 'MULTIDISCIPLINARY INTERNATIONAL ACADEMIC RESEARCH CONFERENCE ANNA UNIVERSITY-PSGIM-ARC 2016 to be held at Coimbatore, India, during February 18-19th, 2016.

ARC has a natural flair for finer sophistication in creating interest and exchanging knowledge in the field of Economics and Business Management featuring all aspects of major developments in the global setup as well as realities. This conference has been successful in exchange of skills and acumen on theory and practice in the areas of managements. The selections of papers with blind refereeing and neatly classifying them based on themes are second to none. I believe that this two day conference will add to stock of knowledge and to young researchers in understanding the nuances involved in theory and policy making.

I am sure that that the two days deliberations of this 'International Conference will create lots of excitements to all the participants in meeting participants of different parts of the world. I extend my sincere wishes for a great success for this conference.



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ANNA UNIVERSITY-PSGIM- ARC MULTIDISCIPLINARY INTERNATIONAL ACADEMIC RESEARCH CONFERENCE (MIARC - 2016)

DATE: February 18-19th, 2016 LOCATION:

PSGIM Campus, Coimbatore, India

TIME	AGENDA	PLACE	
08:00 - 9.00	REGISTRATION	PSGIM	
9.00- 11.30 AM	ONFERENCE INNAGURATION Welcome and Inaugural Address: Dr. Nandagopal Director, PSGIM Chief Guest: Dr. R. Jayavel Director Research Anna University, Chennai Key Note Speaker: Dr. Xavier Pro- Chancellor, Karunya University, Coimbatore Special Address: Dr. Saravana Kumar Dean, Anna University Coimbatore Campus Vote of Thanks: Dr. K. Ravichandran Associate professor and Director of Experiential Learning, New York Institute of technology, Abudhabi Campus, UAE		
11.30-11.45	Tea Time and Academic Exchange	PSGIM Campus	
11.45-1.00	Technical Session (Day1)	PSGIM Campus	
1:00 - 2:00	LUNCH BREAK	PSGIM Campus	
2:15 - 3.15	Plenary Speech	PSGIM Campus	
3.15 - 4.30	Technical Session (Day 1)	PSGIM Campus	
10-11.00	Plenary Speech	PSGIM Campus	
11-1.00	Technical Session (Day2)	PSGIM Campus	
1:00 - 2:00	LUNCH BREAK	PSGIM Campus	
2:15 - 3.15	Plenary Speech	PSGIM Campus	
3.30-5 PM	Technical Session (Day 2)	PSGIM Campus	
5.00-5.45	Best Paper Award and Certificate Distribution	PSGIM Campus	

Conference Schedule

DAY1

Thursday 18th February 2016 Technical Session 1 - Engineering

Time: 11.30 AM to 1.00 PM – VIVA Hall

Moderator

Dr. S. R. Devadasan PSG College of Technology, Coimbatore, Tamil Nadu. India

Plenary Speech: Dr. S. R. Devadasan PSG College of Technology, Coimbatore, Tamil Nadu, India

Technical Session 1

Single Neuron Cascaded Neural Network for Face Recognition System using HOG Features John Dhanaseely, Dr. S. Himavathi and Dr. E. Srinivasan Dept of EEE Pondicherry, Engineering College, Pondicherry.

A Technical Note on Electrochemical Deburring Satisha Prabhu and Dr. Abhishek Kumar Department of Industrial Engineering, Pandit Deendayal Petroleum University, GANDHINAGAR-382007.

Real-time credit card fraud detection using streaming analytics U. Rajeshwari MTech CSE SIT Tumkur

Hardware Assisted Information Hiding for Image Data Security Dr. Harsh Vikram Singh Department of Electronics, Kamla Nehru Institute of Technology, Sultanpur, India Prof. Anand Mohan Director, National Institute of Technology, Kurukchetra, India

FAME Production from Jatropha Oil using Lipase Enzyme from Aspergillus Terrus Narasimhan V Research Scholar, Department of Biotechnology, Sathyabama University, India Valentin Bhimba B

Department of Biotechnology, Sathyabama University, India.

LUNCH BREAK - 1.00-2.00 PM

Technical Session 2 – Engineering

Time: 2.15 PM to 4.30 PM – VIVA Hall

Moderator

Dr. P. V. Mohanram Principal, PSG Institute of Technology and Applied Research, Coimbatore, India

Plenary Speech: Dr. P. V. Mohanram Principal PSG Institute of Technology and Applied Research, Coimbatore, India.

Technical Session 2

Research on the Comprehensive Energy Consumption of Aluminum in China based on Grey Model Zhao He-chun, Hu Fu-rui, Liu Shi-shi Accounting Institute of North China University of Technology, Beijing.

Quadcopter UAV Based Fertilizer and Pesticide Spraying System Mr. S. Meivel, Dr. R. Maguteeswaran, Mr. N. Gandhiraj & Mr. G. Srinivasan Jay Shriram Group of Institutions, Tirupur, Tamilnadu, India

Analysis and Comparison of Ultrasonic Insertion Process Using Brass and Stainless Steel Horns

Kamalaesh U K, Dr. Elangovan S

Department of Production Engineering, PSG College of Technology, Coimbatore, Tamil Nadu.

EXPERIMENTAL INVESTIGATION OF NANO TITANIUM DIOXIDE ON CONCRETE USING BLACK PULP LIQUOR AS AN ADMIXTURE Aravind . R

Assistant Professor, Mech Department, Kalasalingam University, Krishnankoil

TVPM: Time Variant Pattern Mining Approach for Job Shop Scheduling on Non-Identical Machines Mrs. S. Kavitha

Assistant Professor, Mech Department, Kalasalingam University, Krishnankoil

Conference Schedule

DAY 2

Thursday 19th February 2016 Technical Session 3 – Management

Time: 11.30 AM to 1 PM – VIVA Hall

Moderator

Dr. Vivek Professor PSG Institute of Management, Coimbatore, India

Plenary Speech: Dr. Vivek Professor PSG Institute of Management, Coimbatore, India

Technical Session 3

A Study about Effectiveness of Employee Motivation at Hantex, Trivandrum Divya S L, Dr. Sham N.J Allama Iqbal Institute of Management, Peringammala, Trivandrum

Influence of Promoters, Directors, and Debt on Voluntary Disclosure Levels: Indian Evidence Dr. Rama Seth Professor of Finance, IIM Calcutta

The Relationship between Organizational Climate and Organizational Citizenship Behavior among Employees in Infrastructure University Kuala Lumpur (IUKL), Selangor, Malaysia. Asokan Vasudevan Infrastructure University Kuala Lumpur, Selangor, Malaysia

Export Performance Of Agriculture Products from India Dr. G. Chandrasekaran, Assistant Professor & Mr.Prabhakaran, Research scholar Department of Commerce, Chikkanna Government Arts College, Tiruppur, Tamilnadu, India.

The Impact of Technology on Business Dr. Satyajeet S Deshpande Assistant Professor, New L J Commerce College, Gujarat University

LUNCH BREAK - 1.00-2.00 PM

Technical Session 4 - Management

Time: 2.15 PM to 4.30 PM – VIVA Hall

Moderator Dr. K. Ravichandran Associate Professor, School Of Management, New York Institute of Technology, Abu Dhabi Campus, UAE

Plenary Speech: Understanding Research Dr. K. Ravichandran Associate Professor, New York Institute of Technology, Abu Dhabi Campus, UAE

A Study of HR Practices on Aviation Software Project Outcomes JoJo Williams and Dr. C. Sengottuvelu SCMS Cochin School of Business Prathap Nagar, Muttom, Cochin

Human Resources Development: Special Education for differently Abled Dr. Mababir Prasad Yadav Department of English, Lakshmibai College, University of Delhi, New Delhi, India

Incentives when Environment and Unobservable Managerial effort Complement Krishnamurthy Surysekar

School of Accounting, Florida International University, Miami, FL

E-marketplaces: The new mantra of farmer-centric agri business marketing in Karnataka

Rachana Pujar & Dr. S Manoharan Department of Management Studies and Research Centre at BMS College of Engineering, Bangalore.

Buying Behaviour of Smart Phones among Undergraduate Students Anisha John A and Dr. C. Sengottuvelu CPM(ISM_USA) Research Scholar, Bharathiar University, Coimbatore, TamilNadu. India.

CONTENTS

Proceeding of

ANNA UNIVERSITY-PSGIM- ARC MULTIDISCIPLINARY INTERNATIONAL ACADEMIC RESEARCH CONFERENCE

(MIARC - 2016)

REF. No.		Page No
1	Research on the Comprehensive Energy Consumption of Aluminum in China based on Grey Model Author: Zhao He-chun, Hu Fu-rui, Liu Shi-shi, Accounting Institute of North China University of Technology, Beijing, 100144.	1-7
2	Human Resources Development: Special Education for Differently Abled Author: Dr. Mahabir Prasad Yadav, Department of English, Lakshmibai College, University of Delhi, New Delhi, India	8-12
3	An Analysis of Employee Motivation at Kerala State Handloom Weavers' Co- Operative Society in Trivandrum Authors: Divya S L and Dr. Sham N j, Professor, faculty of management studies, AIIM, Trivandrum, Kerala	13-20
4	A Study of HR Practices on Aviation Software Project Outcomes Authors : JoJo Williams, Research Scholar, Bharathiar University, Coimbatore- 641 046 Dr. C. Sengottuvelu, CPM(ISM-USA), Professor & Doctoral Research Supervisor, SCMS Cochin School of Business, Prathap Nagar, Muttom, Cochin-683106	21
5	 Single neuron Cascaded Neural Network for Face Recognition System using HOG features Authors: John Dhanaseely, Research Scholar, Dept of EEE Pondicherry, Engineering College, Pondicherry Dr. S. Himavathi, Dept of EEE Pondicherry, Engineering College, Pondicherry Dr. E. Srinivasan, Dept of EEE Pondicherry, Engineering College, Pondicherry 	22-29
6	A Technical Note on Electrochemical Deburring Authors: Satisha Prabhu , Research Scholar, Department of Mechanical Engineering Dr. Abhishek Kumar K, Assistant Professor, Department of Industrial Engineering, School of Technology, Pandit Deendayal Petroleum University, Gandhinagar - 382 007	30-41
7	Buying Behaviour of Smart Phones among Undergraduate Students Authors: Anish John A, Research Scholar, Bharathiar University, Coimbatore- 641 046 Dr. C. Sengottuvelu, CPM(ISM-USA), Professor & Doctoral Research Supervisor, SCMS Cochin School of Business, Prathap Nagar, Muttom, Cochin-683106	42-50
8	A Study on the Performance of Textile Sector in Tanzania- Challenges and Ways forward Authors: Keregoro Chirongo Moses, Glorious Sun School of Business and Management, Donghua University, Shanghai (PRC)	51-63
9	Influence of Promoters, Directors, and Debt on Voluntary Disclosure Levels: Indian Evidence Authors: Dr. (Ms.) Rama Seth, Professor, Finance & Control, IIM Calcutta, Kolkota, India	64-80

10	Quadcopter UAV Based Fertilizer and Pesticide Spraying SystemAuthors: S. Meivel M,E, Dr. R. Maguteeswaran Ph.D and N. Gandhiraj B.E, Jay ShriramGroup of Institutions, Tirupur, IndiaG. Srinivasan, Kamaraj College of Engineering & Technology, Virudhunagar, India				
11	Incentives when Environment and Unobservable Managerial Effort Complement Authors: Krishnamurthy Surysekar, School of Accounting, Florida International University, Miami, FL 33199	86-90			
12	Analysis and Comparison of Ultrasonic Insertion Process Using Brass and Stainless Steel Horns Authors: Kamalaesh U K and Dr. Elangovan S., Department of Production Engineering, PSG College of Technology, Coimbatore 641004. India	91-111			
13	Leadership and Motivation in US Multinational Corporations Operating in Singapore Authors: Rugaya M. Gaus, Universiti Islam Antarabangsa, Malaysia Manzoor Ali Mirani, Universiti Tun Abdul Razak, Malaysia M.S.B. Siddiq, Universiti Tun Abdul Razak, Malaysia	112-124			
14	FAME production from jatropha oil using lipase enzyme from Aspergillus terrus Authors: Narasimhan V, Research Scholar, Department of Biotechnology, Sathyabama University, India Valentin Bhimba B, Department of Biotechnology, Sathyabama University, India	125-131			
15	The Relationship between Organizational Climate and Organizational Citizenship Behavior among Employees in Infrastructure University Kuala Lumpur (IUKL), Selangor, Malaysia Author: Asokan Vasudevan, Infrastructure University Kuala Lumpur, Selangor, Malaysia	132			
16	Real-time credit card fraud detection using streaming analytics Author: U. Rajeshwari, MTech CSE, SIT Tumkur	133			
17	 Review of consumer behavior towards organic food products in Bangalore City Authors: Shashikiran. K, MBA, UGC NET. (Ph.D), Doctoral Research Scholar, Department of Management, Pondicherry University, Karaikal. Dr. Madhavaiah. C, MBA., M.Phil., Ph.D., Assistant Professor, Department of Management, Pondicherry University, Karaikal Campus, Nehru Nagar, KARAIKAL – 609 605 	134			
18	Impact of Sovereign Gold Bonds in India (Sovereign Gold Bonds) Author: Ganesh Sengottaiyan	135			
19	Enhancement in the heat transfer using Al ₂ O ₃ Nanofluid in double pipe helical coil heat exchanger at different concentrations. Authors: Sancheti Santosh D, Department of Mechanical Engineering, PRIST University, 613403, India P.R. Suresh, Centre for Research and Development, PRIST University, 613403. India	136			
20	TVPM: Time Variant Pattern Mining Approach for Job Shop Scheduling on Non-Identical Machines Author: Mrs. S. Kavitha, Assistant Professor, Mech Department, Kalasalingam University, Krishnankoil	137			

21	Healthcare Information Exchange through Integrated Healthcare Repository System	138
	Authors: Thenmozhi Subramanian, Department of Electronics & CommunicationEngineering,NPR College of Engineering and Technology, Tamil Nadu.Gunasekar Thangarasu, Department of Computing and Information Technology UniversityTechnology Petronas Ipoh, MalaysiaKayalvizhi Subramanian, Department of Civil Engineering and Built EnvironmentLinton University College, Negeri Sembilan, Malaysia	
22	DEVELOPMENT STRATEGIES OF A NATIONAL COMPANY IN TRANSNATIONAL OLIGOPOLISTIC MARKET: The case of Cooperative Pascual Author: Jose G. Vargas-Hernandez, University Center for Economic and ManagerialSciences, University of Guadalajara, Periférico Norte 799, Edif. G. 201-7, Núcleo Universitario Los Belenes, Zapopan, Jalisco, 45100, México	139

Research on the Comprehensive Energy Consumption of Aluminum in China based on Grey Model

Zhao He-chun, Hu Fu-rui, Liu Shi-shi (Accounting Institute of North China University of Technology, Beijing, 100144)

Abstract

There are serious problems of energy consumption among China's aluminum industry. To have a knowledge of the trend of comprehensive energy consumption of aluminum industry, we analyzed the data of comprehensive energy consumption of aluminum industry in China 2004-2013 in this paper based on the grey model GM (1,1). The result shows that the prediction accuracy class is A(excellent) by using the grey model for the comprehensive energy consumption of aluminum. The forecast results are reliable, and can reflect the actual situation and the trend of the comprehensive energy consumption of aluminum in China.

Keywords: Aluminum; Comprehensive energy consumption; Grey model GM (1,1)

INTRODUCTION

There are more than 50 years history of aluminum industry in China, and it has formed a relatively complete industrial cluster. Especially, electrolytic the aluminum and alumina industrv is developing rapidly, and have a good development prospects. However, China's aluminum industry is facing development bottlenecks to be solved. For example, the comprehensive energy consumption of aluminum restricts the development of aluminum industry. So we will analyze the data of comprehensive energy consumption of aluminum industry of China in 2004-2013 in this paper based on the grey model GM (1, 1), and predict more accurate information about the comprehensive energy consumption of aluminum, so that we can provide more accurate data support for the macro energy decisions.

The grey system theory, which was founded by Deng Ju-long in 1982, is used to analysis those information which is not unknown neither clear. Depiction of the grey system method included the "gray "grey matrix" equation", and "grey parameters". It's commonly used to forecast the energy consumption because it's less requirements for information, more simple

for calculating and more accurate and easier testing. The GM (1,1)' accuracy depends on the average relative residuals (ε_{avg}) and the standard deviation ratio (C) and the small error probability(P). It's shown in the Table 1.

DATA SOURCES

In this paper, the sample data of 2004-2013 are from the China Nonferrous Metals Industry Year Book. The simulation results are verified by the relative error test and residual test, and the precision of the model is analyzed. The data are shown in the Table 2.

According to the Table 2, the aluminum comprehensive energy consumption continued to decline year by year in 2004— 2013. It shows that the energy efficiency of China's aluminum industry is gradually improving, the aluminum industry are more and more ecological and environmental protection. The trend is shown in figure 1.

THE DIFFERENCE ANALYSIS

In this paper, GM (1, 1) is established by the comprehensive energy consumption of Aluminum and used to forecast the comprehensive energy consumption in the future. To simplify calculation, we used kwh/t as unified unit.

Let the aluminum composite power consumption sequence χ (0), then $\chi^{(0)} = (\chi^{(0)}(1), \chi^{(0)}(2), \chi^{(0)}(3), \chi^{(0)}(4), \chi^{(0)}(5), \chi^{(0)}(6), \chi^{(0)}(7), \chi^{(0)}(8), \chi^{(0)}(9), \chi^{(0)}(10))$

=(23328.4, 23063, 22517.6, 22310.5, 21978.8, 22162.8, 21776.7, 21538.4, 21340.9, 21057.4)

Step one: Test and verify the feasibility of the model, carry out the ratio test.

The class ratio sequences of $\chi^{(0)}$:

- $\begin{aligned} \sigma^{(0)} &= \ (\sigma^{(0)}(1), \ \sigma^{(0)}(2), \ \sigma^{(0)}(3), \ \sigma^{(0)}(4), \\ \sigma^{(0)}(5), \ \sigma^{(0)}(6), \ \sigma^{(0)}(7), \ \sigma^{(0)}(8), \ \sigma^{(0)}(9)) \\ &= & (1.0115, \ 1.0242, \ 1.0093, \ 1.0151, \end{aligned}$
 - 0.9917, 1.0177, 1.0111, 1.0093, 1.0135)

All of the energy consumption data sequence $\chi\left(0\right)$ is corresponding to the level

ratio of the coverage area of $\sigma^{(0)}(k) \in (e^{-\frac{2}{n+1}})$

 $e^{\frac{2}{n+1}}$) =(0.8338,1.1994), all the class ratio sequences are within the region, it is

possible to establish GM (1,1) model.

Step two: accumulating a χ (0), generate a sequence χ (1).

 $\begin{aligned} \chi^{(1)} &= (\chi^{(1)}(1),\,\chi^{(1)}(2),\,\chi^{(1)}\left(3\right),\,\chi^{(1)}\left(4\right),\,\chi^{(1)}\left(5\right), \\ \chi^{(1)}\left(6\right),\,\chi^{(1)}\left(7\right),\,\chi^{(1)}\left(8\right),\,\chi^{(1)}\left(9\right),\,\chi^{(1)}\left(10\right) \end{aligned}$

=(23328.4, 46391.4, 68909, 91219.5, 113198.3, 135361.1, 157137.8, 178676.2, 200017.1, 221074.5)

Step three: calculate the estimating parameter columns.

Among them,

$$\mathsf{B} = \begin{bmatrix} -\frac{1}{2}(\chi^{(1)}(1) + \chi^{(1)}(2)) & 1\\ -\frac{1}{2}(\chi^{(1)}(2) + \chi^{(1)}(3)) & 1\\ \vdots & \vdots\\ -\frac{1}{2}(\chi^{(1)}(n-1) + \chi^{(1)}(n)) & 1 \end{bmatrix}$$

-34859.91 -57650.21 -80064.251 -102208.91 -124279.71 -146249.451 -1679071 189346.65 1 210545.8 1-23063 22517.6 $\chi^{(0)}(2)$ 22310.521340.9 21057.4

After calculation,
$$\hat{\alpha}$$
=(α , [0.010098153]

Among them, α=0.010098153, β= 23220.7192628

 β)^T=(B^TB)⁻¹B^TY_n=

Step four: seek time response function that determines GM (1,1) forecast model.

$$\chi^{(1)}(0) = 23328.4, \frac{\beta}{\alpha} = 2299501.628$$

GM (1,1) time response function

$$\hat{\chi}^{(1)}(k+1) = \left[\chi^{(1)}(0) - \frac{\beta}{\alpha}\right] e^{-\alpha k} + \frac{\beta}{\alpha}$$

,k=0,1,2,....,n

So make sure GM (1,1) prediction model:

$$\hat{\chi}^{(1)}(k+1) = -2276173.228e^{-0.010098153k} + 2299501.628$$
$$\hat{\chi}^{(0)}(k+1) = \hat{\chi}^{(1)}(k+1) - \hat{\chi}^{(1)}(k) \ (k=0, 1, 2, \dots)$$

Step five: GM (1,1) prediction model checking.

(1) Residual test

According to the Equation, calculated $\hat{\chi}^{(1)}(\mathbf{k})$, and then lago

 $\hat{\chi}^{(0)}(\mathbf{k})$ Sequence, and calculate residuals $\Delta^{(0)}(\mathbf{k}) = \chi^{(0)}(\mathbf{k}) \cdot \hat{\chi}^{(0)}(\mathbf{k})$, the relative residuals $= \varepsilon(\mathbf{k}) = \frac{\Delta^{(0)}(\mathbf{k})}{\chi^{(0)}(\mathbf{k})} \times 100\%$ calculated

results are shown in Table 3.

The average residual of the model is $\boldsymbol{\epsilon}_{avg}$

 $=\frac{1}{n}\sum_{k=1}^{n}|\varepsilon(k)|=$ 0.4223%<0.01. The

prediction accuracy of the model is the primary (excellent) according to Table 1. (2)Posterior difference test

The mean and variance of the modeling sequence $\chi^{(0)}$ (k), respectively

 $\overline{\chi}$ =22107.45, S_1^2 =528475.4272, S_1 =726.963154.

The mean and variance of residuals were

 $\overline{\Delta} = 0.17204$, $S_2^2 = 18656.66899$,

$$S_2 = 136.5894176$$

Posterior difference ratio

$$C = \frac{S_2}{S_1} = 0.1867 < 0.35,$$
$$P = P\{ \left| \Delta^{(0)}(k) - \overline{\Delta}^{(0)} \right| < 0.6745S_1 \} = 1$$

> 0.95

After the test of the residuals and the posterior difference test, Comparison of test results with model accuracy test grade 1-1, the prediction accuracy of the GM (1,1) model in this paper is of the first order (excellent). The Specific fitting degree of the model is shown in figure 2.

Figure2 shows that the mathematical expression of the GM (1,1). It is specifically expressed as

 $\left\{ \begin{array}{l} \hat{\chi}^{(1)}(k+1) = -2276173.228e^{-0.0100\,98153k} + 2299501.628 \\ \hat{\chi}^{(0)}(k+1) = \hat{\chi}^{(1)}(k+1) - \hat{\chi}^{(1)}(k) \ (k=0,\ 1,\ 2,\ \dots \dots) \end{array} \right. , \label{eq:constraint}$

It can be known that data fitting degree of the model is good, the forecast accuracy is high, and the actual data is basically consistent, so using the grey model can predict the comprehensive energy consumption of aluminum in the next few years.

4 Forecast Analysis

According to GM (1, 1) prediction equation:

 $\hat{\chi}^{(1)}(k+1) = -2276173.228e^{-0.010098153k} + 2299501.628,$

Respectively, make k=10,11,12...19. Get the forecast value of comprehensive energy consumption of aluminum in the next 10 years, the results are shown in Table 4.

Table 4 shows that the comprehensive energy consumption of aluminum in China will be decreased in the next ten year, it was 20883kwh/tin 2014, and then decreased to 19068 kwh/t in 2023, the average annual reduction rate is 8.69%. Compared with consumption in 2004-2013, the descend range was slightly slowed down, and the specific trend were shown in Figure 3.

CONCLUSIONS

In this paper, the GM (1,1) model is used to predict the trend of the comprehensive energy consumption of aluminum in China in next ten years.

(1) The prediction accuracy class is A(excellent) by using the grey model for comprehensive China's energy consumption of aluminum .The forecast results are reliable, and reflect the actual situation and the trend of the comprehensive energy consumption of aluminum in China.

(2) Although the prediction of comprehensive energy consumption of aluminum in China shows a declining trend in the next 10 years, the production of aluminum industry in China should be adjusted as soon as possible to optimize the production process, and reduce consumption of energy.

(3) Compared with other mathematical model, GM (1,1) model is more simple and easier to be built, the requirement of regularity and integrity of the data is less. However, GM (1,1) model does not consider the long-term changes of economic environment and relevant national policies, as a result, GM (1,1) model is mainly limited to short-term and medium-term projections.

REFERENCE

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Model accuracy class	The average relative residuals (ε _{avg})	Standard deviation ratio C	Small error probability P	
1st (excellent)	0.01	< 0.35	> 0.95	
2nd (qualified)	0.05	< 0.5	> 0 .8	
3rd (marginal)	0.10	< 0.65	> 0.70	
4th (defective)	0.20	≥ 0.65	<u>≤</u> 0.70	

Table 1 GM (1,1)' accuracy class reference table

Year	Comprehensive energy consumption of aluminum (Kwh/t)	Comprehensive energy consumption of alumina (Kgce/t)*	Comprehensive energy consumption of aluminum ingot (Kwh/t)	
2004	23328.4	1180	15470	
2005	23063	1130.5	15294	
2006	22517.6	1090.2	14932.3	
2007	22310.5	1023.4	14795	
2008	21978.8	998.2	14575	
2009	22162.8	802.7	14697	
2010	21776.7	868.1	14441	
2011	21538.4	794.4	14283	
2012	21340.9	631.3	14152	
2013	21057.4	590.6	13964	

Table 2 Comprehensive energy consumption data

* The power equivalent 0.1404kgce / kWh conversion

2016

Table3 Calculation results of the actual values, fitted values and residuals

Years	χ ⁽⁰⁾ (k)	χ̂ ⁽⁰⁾ (k)	χ ⁽¹⁾ (k)	$\hat{\chi}^{(1)}(\mathbf{k})$	$\Delta^{(0)}(k)$	$\epsilon(k)\%$
2004	23328.4	23328.4	23328.4	23328.4	9.4587	4.0546
2005	23063	22869.48	46391.4	46197.88	193.5186	0.8390
2006	22517.6	22639.70	68909	68837.59	-122.1040	-0.5422
2007	22310.5	22412.24	91219.5	91249.82	-101.7353	-0.4559
2008	21978.8	22187.05	113198.3	113436.87	-208.2519	-0.9475
2009	22162.8	21964.13	135361.1	135401.01	198.6688	0.8964
2010	21776.7	21743.45	157137.8	157144.45	33.2498	0.1526
2011	21538.4	21524.99	178676.2	178669.44	13.4136	0.0622
2012	21340.9	21308.72	200017.1	199978.16	32.1824	0.1508
2013	21057.4	21094.62	221074.5	221072.78	-37.2216	-0.1767

Years	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Comprehensive energy consumption of aluminum	20883	20673	20466	20259	20056	19854	19655	19458	19262	19068





Figure 1 the trends of comprehensive energy consumption of aluminum



Figure 2 the fitting figure of calculation value and the actual value



Figure 3 Forecast trend of comprehensive energy consumption of aluminum

Human Resources Development: Special Education For Differently Abled

Dr. Mahabir Prasad Yadav

(Department Of English, Lakshmibai College, University Of Delhi), New Delhi, India

INTRODUCTION

Certain values or necessities are essential for human beings for conducting their life in a dignified manner. Human resources development i.e., education is one of the essential values such as food, clothing, shelter medical care / health etc. We all human beings differ from each other in some way or the other; And hence, the ways we all acquire learning, knowledge, and wisdom differ from each other as the product in the process of human resources development.

However, those children who have some physical deficit such as loss of vision, limbs, hearing and learning disabilities have been referred to as differently abled according to the most recent coinage. These children have special needs for acquisition of learning and attainment of education.

Education, as a social philosophy, process and product is actually the means human resources development. of Education is also the modification of human behaviour. The process of educating and the modification of the behaviour of children with disabilities or the differently abled children with special needs has been termed as special education.

As a human resource, special education is the means of rehabilitation of children or the people with physical impairment. It is a boon for the empowerment of persons with disabilities. Hallahan, D. P. And Kauffman, J.M. (2007) are of the view that special education a specially designed instruction which fulfils the extraordinary needs of some extraordinary children. For this activity, special teaching aids, special teaching techniques, special equipments and special facilities can be essential innate abilities and the hidden talents in the differently abled children with the special needs.

The use of Braille for the visually challenged and the large print for the low vision is an example. Apart from this, the arrangement of proper light in the classroom, seating arrangement, special kind of verbal instructions, and specially trained teachers for the use of special equipments or appliances or teaching aids are included in this.

According to William L. Heward, (1996) special education is a system consequent upon awareness braught in the groups of parents of the disabled children as a process of implementation of various Government or constitutional provisions.

Linda Wilmshurst (2005) has asserted that special education is an indicator of a kind of educational procedure which is designed according to the needs and nature of disabled children.

According to Encyclopedia of special education of Cecil R. Reynolds (2007) Special education subsumes educational services basically rendered to the children with visual impairment, hearing impairment, orthopedically impaired, mentally retarded, the exceptional children and the children with learning disabilities.

According to Prof. K.C. Panda, (2004) special education has four important elements, which are given as under:-

- a) Special teacher
- b) Special curricula
- c) Special teaching techniques
- d) Special instructional materials.

Professor Panda is assertive that these aforesaid four elements are extremely crucial and essential in special education and imparting of special education to disabled children remains incomplete in the absence of these four elements.

The main objective of special education is actually to grant equal opportunities of education to each and every one of the children with special needs, called differently abled.

Differently abled persons are also the inseparable parts of human society, and therefore, their participation in the mainstream of the nation and society must be ensured.

As a human resources development, Special education plays a crucial role in the equalization of opportunities of education, employment, food, clothing, shelter, health, medical care and all those essential values of human life which are necessary for conducting life in the society in an honourable and dignified manner.

It plays a very vital role to enable the rehabilitation of the children and adults with disabilities. In the special educational process, according to the nature, needs, abilities, skills, and aptitude of the disabled children, such an educational system should be evolved by which the effects of disabilities can be minimized and the development of the children with special needs is ascertained and made possible so as to enable such children to realize their dreams, aspirations, ambitions, and their full potentials. In this way, it can be said that special education is a process and a system in which the social and educational needs of the disabled children are fulfilled taking their special needs, their nature and extent of disabilities into due considerations. The aims and objectives of this kind of special education is the complete development of children with disabilities.

QUALITY EDUCATION

For the attainment of the objectives of special education, imparting quality education to the children with special needs is the greatest challenge before the special educators in the present spectrum.

Students with special needs should be imparted quality education at par with their counterparts irrespective of whether it is facilitated in special schools, in integrated or inclusive settings. The mere grant of admission to disabled children in the mainstream schools of inclusive settings will be of no avail and no consequential benefits whatsoever will accrue if inclusion doesn't take place at the levels of curriculum development, at the level of infrastructure development, school management, library, playground, pedagogical level, providing learning resources in the accessible formats. examination, assessment and evaluation systems etc. which are all parts and parcels of educational and academic process.

The facilitation of quality education is indelible for the character building of the disabled individuals, their all-round development and above all, for the actual empowerment of persons with disabilities. Quality education should enable the differently abled persons in such a way that they are capable of exploring and delving into the depths and dimensions of the universe, existence and the society that their social inclusion is ensured without launching agitation or knocking at the judicial doors at the latter stages of life. In the absence of quality education for differently abled persons, the philosophy of social inclusivism would remain just a fantasy, far from fructifying or factualizing to the optimum level.

TECHNOLOGY IN CONSONANCE WITH BRAILLE

Advent and advancement of technology in the postmodern era has eased the facilitation of a vast body of knowledge to the physically and visually challenged persons. The good quality training both in computer, internet and Braille should be imparted to the differently abled persons with special needs so that the advantages of technological advancement accrue to them as well. Both Braille and computer should be taught to disabled persons in consonance with each other/ and none should be discarded aside at the cost of the other. The advanced assistive technology for the differently abled should not merely be made available. but. it should be made affordable, accessible, acceptable and adaptable so as to reach to the needs of the individuals with disabilities.

It has perturbed this author to observe that several institutions and individuals are derelicting the significance of Braille in the education of visually impaired children on the flimsy ground of computer education; which indeed, is a sad state of affairs, as no other alternative to Braille can enhance the quality of education and transform the differently abled persons into useful productive human resources of the nation, society and the world at large.

As the Braille the bi-product of technology and technology to a very large extent contributed to the betterment celerity, production of readable materials, delivery output, a day may come, when in near future disabled persons may obtain informations in paperless Braille.

The necessity is to enable the disabled children and adults to use it to the desired extent.

PERSPECTIVES IN SPECIAL EDUCATION

Such perspectives, vis-a-vis special school education, integrated education and inclusive education for children with special needs are prevalent in the country, though itinerant model and resource teacher model are also talked of sometimes.

Differently abled students and their parents should be left at their own accord to decide and exercise their freedom of choice for obtaining education in the desired setting as envisaged in the United Nations Convention on the Rights of Persons with Disabilities.

NATIONAL AND INTERNATIONAL LAWS

Article 41 of the Constitution of India under its Directive Principles of State Policy envisages the provision of granting education and providing the public assistance among others to persons with "disablement." The provisions of providing education to persons with disabilities is contained in chapter V of PWD Act 1995.

The National Policy on Persons With Disabilities 2006 has also rendered some perspectives of the Government of India for the enhancement of the education of differently abled persons with the advent of technological revolution. Through a subsequent amendment in Right To Education Act in 2012 children with disabilities have been explicitly included the and placed in category of "disadvantaged children" which is highly commendable and exceedingly worth eulogising by all means and manners.

At the international arena, the United Nations Convention on the Rights of

10

Persons with Disabilities vide its article 24 (2-E) and (2-CC) has sought to make elaborate provisions on right to education of differently abled persons. At the Asia and Pacific regional level, the Incheon strategy "To Make the Right Real" also contains early intervention and education as one of the ten objectives to be attained by 2022.

Further more, while at the national level, the amendments brought about in the Copyright Act is an important and commendable initiative to be taken in the right direction, the adoption of the Marrakesh Treaty by Wipo will have farreaching impact. Such a positive measure goes a long way in the ensuring of the barrier-free production of books in Braille and other accessible formats that are already available in public domain without having one to run from pillar to post for seeking permission of the holder of copyright to serve this objective.

Clashes. conflicts and inconsistencies between PWD. Act 1995 and RTE. Act 2010, (as amended in 2012) incompatibility and inconsistencies between the provisions contained in corresponding UNCRPD. And proposed and currently pending RPD. Bill in Rajya Sabha should be examined and the vast gulf or hiatus must be eliminated at every cost. The deficiencies in the guidelines and instructions issued from time to time under RTE. Act 2010 to meet the educational needs of children with special needs should be open to examination, inspection, criticism and public debate and discussions.

THE ROLE OF NGOS

The most unfortunate affair that has come to the observation of this author is that the disability field has been transformed into trading centre and NGO.S into mongers. The nongovernment organizations, are several times seen busy in outsmarting each other in the name of disability welfare services, siphoning off the financial grants received from the government and embeezlement of public resources; but, the question remains as to who should bell the cat?

They should evolve a proper synergy and coordddination amongst themselves and venture towards the enhancement of excellence and quality education of differently abled persons and enable them to be transformed into employable productive human resources.

Students and teachers with disabilities should be provided with the useful teaching and learning materials as and when demanded to meet their special requirements. The NGO.S should come forward to set up advocacy cells for augmentation of better educational and employment opportunities for disabled persons; and, for the attainment of this objective, intensive training in management, mobility and orientation must be imparted to them, placing it high on their agenda. The NGO.s should also critically review the plans, programmes and policies formulated by the government from time to time for education, training and employment of persons with disabilities.

SUMMATION

The most awful and formidable task for the government as well as NGO.s is to reach out to the poorest of the poor visually and physically challenged persons in order to enable them to receive education and employment so as to conduct a dignified life at par with others in the society. To ensure actual social inclusion of physically and visually challenged and hearing impaired persons, theory must be put into practice, transforming passion into pragmatism.

As William Shakespeare said, "All that glitters is not gold," the only approach that serves the best educational needs, interests and welfare of differently abled persons must be adopted.

It must be ensured that the professionals involved in planning and formulation of programmes and policies should be trained and oriented in such a manner that they evolve a positive mindset, discarding aside the age-old stereotypes, derelicting, and condescending attitude, and consent with the accomplishment of duties and responsibilities for the rise and upliftment of downtrodden on the ground of disabilities.

Once Swami Vivekananda said, "so long as the teeming millions of India continue to reel under abject poverty, I hold every educated man a traitor, who having been educated at their expense pays not the least heed to them."

In nutshell. the disabled poor individuals should be enabled and rehabilitated in such a manner that they come out as creative, imaginative, inventive and explorers and discoverers of the new vista in the new arena; accommodating themselves in the nation, society and world with pride, joy, honour and dignity as assets and not just the liability and onus.

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An Analysis of Employee Motivation at Kerala State Handloom Weavers' Co - Operative Society in Trivandrum

Divya S L*, Dr. Sham N J** **Professor, faculty of management studies, AlIM, Trivandrum, Kerala

Abstract

Handloom sector is a major non-farm employer in India. About 16 million of weavers depend on this sector in the country. Handloom weaving is one of the most important nonagricultural sources of income in India. Indian Handloom Industry is as aged as civilization by itself. Handloom is a significant cottage industry of India having splendid past and traditional value handed down from years to years. In this paper an attempt has been made to analyze the effectiveness of employee motivation Kerala state handloom weavers co - operative society in Trivandrum. The study was based on the sample of 50 weavers. To find out the profile, production, marketing, motivational factors and financial management of weavers cooperative societies, primary and secondary data were collected. The study reveals that central and state governments have evolved many schemes to uplift the motivational factors by providing incentives in the form of grants and loans to impart training on new designs, modernization of looms etc. But handloom weaving units continue to be in the grip of problems. The objective of this paper is to familiarize with the current status of the factors that increase the employee motivation and to find the measures for further improvement of Handloom industry.

Key words:- Weavers cooperative society, motivational factors, production, marketing, financial management

INTRODUCTION

Nonfarm development is a strategic priority for many developing countries during their economic transformation from an agricultural to an industrial society. Handloom industry plays an important role in generating local employment [1] [7]. The installed world capacity of handlooms is 4.60 million. India stands number one in the global scenario of handlooms which possess 85% (3.90 million) of the world installed capacity. Handloom sector is one of the largest occupation generators next to agriculture in India. Nearly 23.77 lakhs handlooms provide direct or indirect employment to 43.32 lakhs weavers and allied workers, of which 36.33 lakhs workers stay in rural areas and 6.98 lakhs workers stay in urban areas and 77.90% are women.

Kerala state Handloom Weavers Cooperative Society limited No-232 known as Hantex is registered as co-operatives and Kerala co-operatives sponsored by the government of Kerala. The registered office of the society is in Trivandrum district of Kerala state Handloom Weavers Cooperative Society (special status) Act-1960. Hantex has one of the largest distribution networks in the state and well established in all major towns and semiurban areas. It has 116 agency showrooms and 167 sales deposits in Kerala and 2 in Tamil Nadu. The product of Hantex is having demand throughout Kerala state through competition with co-opex (Tamil Nadu Handloom Co-operative society). For checking out the product strategy for each region, Hantex sought the help of National

Institute for each design, Ahmadabad and weaver's service center, Kannur.

The share of capital of the society is 3 cores at the time of formation. But now the authorized share capital of the society is 20 cores [7]. Hantex is a protective umbrella to around 450 primary societies, which stated its operations with around 71 outlets an annual sale of around Rs.27 lakes in 1961 has today grown to a large enterprise with 151 sales outlets.

The procurement of handloom goods in 1961-2002 it has risen to Rs.35 cores. Hantex divided Kerala into 7 regional officers. They situated are at Thiruvananthapuram, Kollam, Ernakulam, Trissur, Kozhikode and Kannur. Marketing of Hantex products are based on festival season. The marketing of the products of Hantex are festival season, Export marketing and government supply or bulk sale. More than half of the total sale of Hantex is achieved in Onam a Hindu cultural festival. Government gives 30% of rebate on the products of Hantex for boosting up sales. The huge purchase of cloths made by various government departments

The focus of the study is to enlighten that how the handloom through its employees can achieve success and effectiveness. The purpose of the study is to analyze the effectiveness of employee motivation at Kerala state handloom weavers cooperates society in Trivandrum.

RELATED STUDIES

Motivation

According to Webster's New Colleglate Dictionary, а motive is "something a need or desire that causes a person to act". "Motivate, in turn means "to provide with a motive," and motivation is defined as "the act or process of motivating". Consequently, motivation is the performance or procedure of presenting an intention that origin a person capture accomplishment. to some According to Butkus & Green (1999) [2].

motivation is derived from the word "motivate", means to move, push or influence to proceed for fulfilling a want. Motivation is a set of courses concerned with a kid of strength that boosts performance and directs towards accomplishing some definite targets.

Employee motivation

Among financial, economic and human resources, the latest are more essential and have the capability to endow a company with competitive edge as compared others. Employee to performance fundamentally depend on many factors like performance appraisals, employee motivation, employee satisfaction, compensation, Training and development, Job security, Organizational structure and other, but the area of the study is focused only on employee motivation as this factor highly influence the performance of employees [3]. Getting employees to do their best work even in strenuous circumstances, is one of the employees most stable and greasy challenges and this can be made possible through motivating them.

Factors affecting employee motivation

No one works for free, nor should they. Employees want to earn reasonable salary and payment, and employees desire their workers to feel that is what they are the fundamental aettina. Monev is inducement; no other incentive or motivational technique comes even close it with respect to its influential value. It has the supremacy to magnetize, maintain and motivate individuals towards higher performance.

Research has suggested that reward now cause satisfaction of the employee which directly influences performances of the employee. Rewards are management tools that hopefully contribute to firm's effectiveness by influencing individuals or group behavior [1] [3-4]. All business use pay, promotion, bonuses or other types of rewards to motivate and encourage high level performances of employees. Leadership is about getting things done the right way, to do that you need people to follow you, you need to have them trust you. And if you want them to trust you and do things for you and the organization, they need to be motivated. Theories imply that leader and followers raise one another to higher levels of morality and motivation.

Empowerment provides benefits to and organizations makes sense of belonging and pride in the workforce. In fact, it builds a Win-Win connection among organizations and employees, which is considered an ideal environment in numerous organizations and their employees [5]. Empowering can flourish virtual human capacities. Empowered employees focus their job and work-life with additional importance and this leads to constant progress in coordination and work procedures. No matter how automated an organization may be, high productivity depends on the level of motivation and the effectiveness of the workforce so staff training is an indispensable strategy for motivating workers[6]. One way managers can instigate motivation is to give appropriate information on the sentences of their actions on others.

RESULTS AND DISCUSSION

Kerala state handloom co-operates society was selected randomly from the one selected district of Kerala for the study. A multistage purposive cum random sampling design was followed for selection of employees of Kerala state weavers cooperative society at Trivandrum in view of the prevalence of practice of weaving in those handloom industry. A total of 50 registered weavers' were selected as a study subject. The study involves the collection of primary as well as secondary data. The primary data were collected directly from employees of handloom industry and constituting the major source of data for the study. For this purpose an interview schedule was prepared for

information. The obtaining necessary secondary data relating to handloom industry were collected from the recorded reports from the office of the Kerala state handloom weavers co-operates society at Trivandrum, published and unpublished literature and also internet source has been referred to. The collected data were tabulated and analyzed properly in accordance with the objectives of the present study. The collected data has been analyzed and interpreted with the use of some statistical tools such as percentage method, chi-square test to arrive at afore said objectives.

The Fig. 1(a) shows that 92% of the respondents are satisfied 8% of the respondents are dissatisfied. This statement shows that the motivational factor provided by the company is good.The Fig. 1(b) shows that 20% of the respondents are highly satisfied. 28% of the respondents are satisfied. 4% of the respondents are dissatisfied. 40% of the respondents are highly dissatisfied and 8% of the respondents have on opinion. Fig. 1(b) shows that the trade union prevailing in the organization is very poor.Fig. 1(c) shows that 36% of the respondents are highly satisfied. 12% of the respondents are satisfied. 20% of the respondents are dissatisfied. 12% of the respondents are highly dissatisfied and 16% of the respondents have no opinion. The above statements show that the benefit provided by the company is average.

Fig. 1(d) shows that 16% of the respondents are highly satisfied. 40% of the respondents are satisfied. 20% of the respondents are dissatisfied. 8% of the respondents are highly dissatisfied and 16% of the respondents have no opinion. This statements show that the working environment in the company is good.Fig. 1(e) shows the transport facilities provided by the company were 8% of the respondents are highly satisfied. 40% of the respondents are satisfied. 20% of the respondents are dissatisfied. 20% of the respondents are dissatisfied. 20% of the respondents are dissatisfied. 20% of the respondents are dissatisfied.

15

respondents are highly dissatisfied and 12% of the respondents have no opinion.

Fig. 1(f) shows that 16% of the respondents are highly satisfied. 60% of the respondents are satisfied. 8% of the respondents are dissatisfied. 12% of the respondents are highly dissatisfied and 4% of the respondents have no opinion. These above statements show that satisfaction by co-operation with each other is very good.Fig. 1(g) shows that 32% of the respondents are highly satisfied. 48% of the respondents are dissatisfied. 16% of the respondents are dissatisfied. 4% of the respondents are highly dissatisfied.

Fig. 1(g) shows that the recreation facility provided by the company is very good. Fig. 1(h) shows that 28% of the respondents are highly satisfied. 44% of the respondents are satisfied. 12% of the respondents are dissatisfied. 8% of the respondents are highly dissatisfied. 12% of the respondents have no opinion. This statements show that work schedule and shift pattern following by the company is very good. Fig. 1(i) shows that 12% of the respondents are highly satisfied. 16% of the respondents are satisfied. 32% of the respondents are dissatisfied. 24% of the respondents are highly dissatisfied. 16% of the respondents have no opinion. From the above statement the safety measure provided by the company is very poor.

Fig.2 (a) shows that 28% of the respondents are highly satisfied. 40% of the respondents are satisfied. 12% of the respondents are dissatisfied. 8% of the respondents are highly dissatisfied. 12% of the respondents have no opinion. This statements show that the compensation benefit provided by the company is average. Fig.2 (b) shows that 16% of the respondents are highly satisfied. 60% of the respondents are satisfied. 8% of the respondents are dissatisfied. 16% of the respondents have no opinion. The above discussion shows that the disciplinary procedure of organization is average. Fig.2 (c) shows that 24% of the respondents are

highly satisfied. 28% of the respondents are satisfied. 16% of the respondents are dissatisfied. 20% of the respondents are highly dissatisfied. 12% of the respondents have no opinion. Fig.2 (c) shows that the promotional activity provided by the company is average.

Fig.2 (d) shows that 20% of the respondents are highly satisfied. 60% of the respondents are satisfied. 20% of the respondents are dissatisfied. The above statements show that the job security provided by the company is very good. Fig.2 (e) shows that 8% of the respondents 40% highly satisfied. of the are respondents are satisfied. 24% of the respondents are dissatisfied. 16% respondents are highly dissatisfied. 12% of the respondents have no opinion. This statements show that the employee welfare provided by the company is poor.

Fig.2 (f) shows that 24% of the respondents are highly satisfied. 36% of the respondents are satisfied. 16% of the respondents are dissatisfied. 20% of the respondents are highly dissatisfied. 4% of the respondents have no opinion. Fig.2 (f) shows that the administrative and technical support provided by the company is good. Fig.2 (g) shows that 36% of the respondents are highly satisfied. 40% of the respondents are satisfied. 12% of the respondents are dissatisfied. 12% of the respondents have no opinion. The above statements show that the employee are satisfied with the motivational method provided by the company is good.

Fig.2 (h) shows that 48% of the respondents are highly satisfied. 12% of the respondents are satisfied. 8% of the respondents are dissatisfied. 32% of the respondents have no opinion. Fig.2 (h) shows that grievance handling procedure is the company is good. Fig.2 (i) shows that 12% of the respondents are highly satisfied. 20% of the respondents are dissatisfied. 8% of the respondents are highly dissatisfied. The above statements

show that the leave facility provided by the company is poor.

Fig. 3 (a) shows that 24% of the respondents are highly satisfied. 44% of the respondents are satisfied. 12% of the respondents are dissatisfied. 12% of the respondents are highly dissatisfied and 8% of the respondents have on opinion. Fig. 3 (a) shows that the employees are satisfied with management system. Fig. 3 (b) shows that 20% of the respondents are highly satisfied. 60% of the respondents are satisfied. 8% of the respondents are dissatisfied. 4% of the respondents are highly dissatisfied and 8% of the respondents have no opinion. The above statements show that the satisfaction by sharing day to day and strategic decision making of the company is very good.

Fig. 3 (c) shows that 28% of the respondents are highly satisfied. 52% of the respondents are satisfied. 20% of the respondents are dissatisfied. Fig. 3 (c) shows that the superior-subordinates relationship is very good. Fig. 3 (d) shows that 12% of the respondents are highly satisfied. 20% of the respondents are satisfied. 28% of the respondents are dissatisfied. 40% of the respondents are highly dissatisfied. The above statement shows that the ability to analyze the future trends and predict the consequences is very bad.

Fig. 3 (e) shows that 32% of the respondents are highly satisfied. 60% of the respondents are satisfied. 8% of the respondents are dissatisfied. Fig. 3 (e) shows that satisfaction with the effectiveness of employee motivation that influences productivity of the company is very good. Fig. 3 (f) shows that 28% of the respondents are highly satisfied. 48% of the respondents are satisfied. 8% of the respondents are dissatisfied. 8% of the respondents are dissatisfied. 8% of the respondents are highly satisfied. 8% of the respondents have no opinion. The above statements show that the team work is very good.

FINDINGS OF THE STUDY Profile of weavers at Handloom

The entire handloom industry comes under the National Handloom Development Corporation Limited at the central level, Directorate of Handloom and Textiles Development Corporation, The Handloom Kerala state weavers' cooperative society Limited at the state level. Membership strength of the Weavers Cooperative Society was found to be ranged from 75 to 150 members. The lower age limit for membership was 18 years. The study indicates the massive involvement of female weavers in the Kerala state weavers co-operative society at Trivandrum. Most of the employees are highly satisfied with motivational factors at handloom.

Recognition and employee motivation

According to rewards and recognition are essential factors in enhancing employee job satisfaction and work motivation which is directly associated to organizational achievement.

Α study was conducted in handloom to examine the job satisfaction among handloom weavers at Hantex . A structured questionnaire survey was used and data was gathered from 50 employees. The value of correlation coefficient for recognition was 0.251 which shows that its relationship with job satisfaction is positive. Job satisfaction is directly associated with internal work motivation of employees that enhances as the satisfaction of employees increases. That is why a study says that deficiency of appropriate recognition and rewarding reduces employees work motivation and job satisfaction.

The above literature, studies and discussions fully supports that recognizing employees work increases their motivation to accomplish tasks and executes responsibilities towards them by the handloom industry.

SUGGESTIONS FOR IMPROVEMENT OF HANDLOOM INDUSTRY

Up gradation and modernization

Government should give attention in up gradation and modernization of loom, equipment's and infrastructural development for the betterment of the handloom industry.

Promotional strategies

Society should give more importance to promotional strategies and government should give promotion subsidy to well established society. Society can provide interesting employee promotion tools like rewards, incentives, gifts etc. to create interest and excitement to the employees to work motivate.

Training on employment

Training to enhance the skills of weavers in manufacturing and marketing aspects in changing business environment. Effective implementation of various policies and programs could be successful when there would be proper integration, cooperation and coordination from the government. Skill and design development exercises can be conducted for the weavers which will help them to understand and develop new product range as well as improve their design sensibility.

Job rotation and Opportunities for advancement

It means that employees will be exposed to different kinds of jobs. This certainly would break the monotony of employees. There should never be a stagnation point for any employee during the prime time of his career. The government must always provide opportunities for employees to perform well and move up in the hierarchy.

CONCLUSION

The handloom textiles constitute a timeless part of the rich cultural Heritage of India. The element of art and craft present

in Indian handlooms makes it a potential sector for the upper segments of the market, domestic as well as global. However, the sector is beset with manifold problems such as unorganized production system, insufficient wages, and absence of good guidance from handloom and mill sector. As a result of effective government intervention through financial assistance implementation of and various developmental and welfare schemes, the handloom sector, to some extent, has been able to tide over these disadvantages. Thus handloom forms a precious part of the generational legacy and exemplifies the richness and diversity of our country and the artistry of the weavers.

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Fig.1. (a) The motivational factor. (b) Trade union prevailing. (c) The benefit provided by the company. (d) Working environment. (e) The transport facilities. (f) Satisfaction by co-operation with each other. (g) Recreation facility. (h) Work schedule and shift pattern. (i) Safety measure.



Fig.2. (a) The compensation benefit. (b) The disciplinary procedure. (c) The promotional activity. (d) The job security. (e) The employee welfare. (f) The administrative and technical support. (g) The motivational method. (h) The grievance handling. (i) The leave facility.



Fig.3. (a) The management system. (b) The sharing day to day and strategic decision making of the company. (c) The superior-subordinates relationship. (d) The ability to analyze the future trends and predict the consequences. (e) The effectiveness of employee motivation that influences productivity of the company. (f) The team work.
A Study of HR Practices on Aviation Software Project Outcomes

JoJo Williams Research Scholar Bharathiar University Coimbatore- 641 046 Tamil Nadu, India. jojowilliams@outlook.com Dr.C.Sengottuvelu, CPM(ISM-USA) Professor & Doctoral Research Supervisor SCMS Cochin School of Business Prathap Nagar, Muttom, Cochin-683 106 Kerala, India.

Abstract

This research studies the impact of human resources practices on aviation software project outcomes. Anecdotal evidence indicates that human resources related factors impact software project outcomes, while extant research literature on measuring human resource factors and their impact on aviation software project outcomes is limited. Aviation software projects are some of the most complex projects undertaken in the software industry and critical in terms of requirement of specifications, functionality and safety. As aviation companies continue to expand rapidly into global markets, various ambitious aviation technology projects are being undertaken in various airlines and software companies around the world. In aviation software projects that have many unique and complex characteristics, human resource management play a unique role in promoting the efficient use of complex human resources practices. Although aviation technologies and aviation management techniques have advanced rapidly, project managers still need to pay more attention to staff or people management. Human resources still account for the majority of costs in many aviation software projects owing to the high cost of retaining skilled staff in this field. Aviation software projects normally require a longer time span with multiple entities involved in its successful outcome. HR issues have positive and adverse implications for aviation industries in most airlines. This research paper examines human resource and project management literature and identifies the application of the related project managerial techniques and human resources practices with a focus of aviation related projects, with focus on aviation software systems projects. In addition, the paper uses literature review analysis to describe the nature of human resource management with particular reference to aviation related projects. In this paper, data from a sample of 12 large scale aviation software related projects will be analyzed, from aircraft maintenance, flight operations to reservation system, of an international airline, and its foreign software development vendors, to study the impacts of human resources related practices on these complex systems software project outcomes. The collected data are subject to statistical treatments using ttest and multiple regression analysis. The paper will also summarize the key factors of HRM implementation in international aviation systems projects, and the HRM function of each of project participants over various project periods. A survey of one global airline and its software vendors and software technology participants is limited in the types of information that maybe collected. A larger field of study involving multiple airlines and aviation software vendors can explore the topic in more depth and may benefit from access to written records of various project outcomes.

Keywords: aviation industry, HRM, software development cycle, overruns aviation projects, aviation software project management.

Single neuron Cascaded Neural Network for Face Recognition System using HOG features

John Dhaneseely Research Scholar,

Dept of EEE Pondicherry, Engineering College, Pondicherry

Abstract

This paper proposes a single neuron cascade neural network with Elliot function as activation function (SNCET) based face recognition system (FRS). The single neuron cascade architecture provides nonlinear mapping between inputs and outputs and behaves as a good classifier when the output is based on competition. The power of cascade networks is exploited in this paper for face recognition systems. The Olivetti Research Lab (ORL) data base is used and Histogram of Oriented Gradients (HOG) features are extracted for different training and testing images. The ratio of testing to training images is varied and the recognition performance is analyzed. The performance is compared with more popular feed forward neural network (FFNN). The results obtained are used to draw the major conclusions of the paper.

Keywords-Single neuron cascaded neural network; Elliot function; Face recognition; Feed forward neural network; Histograms of Oriented Gradients; ORL database.

INTRODUCTION

Over the last decade face recognition has made considerable progress in research. This is due need for various applications, such as surveillance systems, access control, digital libraries, human–computer intelligent interaction and smart environments

FRS performance is based on the extraction and classification feature method. There exists large number of feature extraction starting from the Eigen faces or Principal component Analysis, Independent Component Analysis, Local binary pattern, Gabor wavelets and HOG. In general there are two approaches in feature extraction global and local method. Global approaches extracts information from the whole face image, and local information approaches extracts from multiple points in the images. The most famous global method is PCA (Principal Component Analysis extracts features using Eigen faces [1]-[2]. The Eigen vectors of covariance matrix of face

images called as eigen faces. By projecting the face images on to the eigen faces, the linear combination weights for eigen faces are calculated. These weights are used for representing the face. Eigen face is simple and fast but is sensitive to illumination and pose variation. But local methods are robust to such variations.

Scale Invariant Feature Transform (SIFT), Shi & Tomasi corner detector, Local binary pattern Gabor, (LBP), Histogram oriented aradient (HOG) descriptors are some of the methods that extracts local properties. LBP [3] computes a histogram for each pixel in the image with its neighborhoods. However LBP has the disadvantage of sensitivity towards rotation. The other local Gabor features [4]-[5] which is computed by convolving face image with Gabor kernels at different orientations and scales. In this method more number of kernels are applied to the image, which leads to high feature dimensions. This makes hiah computational time. HOG [9] have much

lower complexity in term of computing time when compared to other method, HOG are used in different areas such as human detection [8] object detection and hand gesture recognition . HOG are invariant to 2D rotation. Hence in this paper HOG [6] -[7] features are used for Neural network based FRS. The second aspect of face recognition method is the choice of the classifier. Different familiar classifiers are distance, Euclidean nearest neighbor, Support vector machine and neural network.

Neural networks (NN) [10]-[[13] are used in face recognition due to its rapid classification capability. The neural networks are among the most successful classification systems that can be trained to perform complex functions in the field of pattern recognition. The commonly used neural architectures are multi-layer feed forward neural network (FFNN) and radial Basis Function (RBF). The design of a single layer FFNN is systematic but its nonlinear mapping capability is low leading to huge network size. The multi-layer FFNN has the good nonlinear mapping capability, but the design is not systematic and hence cannot be automated. Cascading one neuron at a time till the performance is obtained can be automated. Neural network uses the activation nonlinear function. Most popularly used function is tan sigmoid. Computation of the nonlinear function is consumina. То reduce time the computational complexity Elliot function is used instead of tan sigmoid function.

In this paper single neuron cascaded architecture with Elliot function as activation function (SNCET) is proposed for classification. In the proposed architecture the input to any neuron includes all the system inputs and the outputs of all previous layers. This results in a cascaded interconnection between the layers leading to more compact structures. The design of the network by cascading

one neuron at a time until the desired performance is obtained. The proposed architecture combines the advantages of single layer FFNN and multilayer FFNN. In this paper, performance of SNCET neural network is compared with feed forward neural network [13] for ORL database. The features are extracted using HOG .The simulated results obtained are presented.

Section II details the HOG based feature extraction. SNCET NN based classifier is presented in section III. Experiments results are shown in section IV. The major conclusions are drawn in section V.

HOG BASED FEATURE EXTRACTION

The HOG descriptor is obtained from the orientations of the image gradients. Its computation technique is simple and fast. this descriptor the local object In appearance and shape can be characterized rather by the distribution of local intensity gradients. The image is divided into many cells, in each of them a histogram counts the occurrences of pixels orientations given by their gradients. The final HOG descriptor is then built with combination of these histograms. In practice, four major steps are involved they are

Step1

In this step Horizontal and vertical gradient are computed.

The input image is convolved with a simple 1-D kernel filter. In each pixel of the input image kernels are applied to which produces separate gradient components in the vertical and horizontal orientations. G_h

and G_{v} are the gradient components.

Step 2

Computing magnitude and orientation of the gradient.

Divide the image into N cells then compute the magnitude $|\nabla I(h, v)|$ and the orientation $\phi(h, v)$ of the gradient. Each pixel is represented by a gradient vector which has the magnitude and direction.

The magnitude is $|\nabla I(h,v)| = \sqrt{G_h^2 + G_v^2}$ (1) and gradient is $\phi = \phi \left(\frac{G_h}{G_v}\right)$ (2)

Step 3

Generating the histogram from orientations and magnitudes. In each cell gradient angles are quantized into a number of bins B, from this identical orientations are accumulated into a histogram. The number of bins B used indicates the length of the histogram vector for each cell .In this work 6 bins are used. **Step 4**

Normalization

After calculating the histogram vector normalization is done . For this purpose a simple Euclidian norm is applied

$$Vn = \frac{V}{\sqrt{\left\|V\right\|^2 + \varepsilon^2}}$$
(4)

Where V is the vector and ε is a small positive value needed when evaluating empty gradients. The facial image feature vector is obtained by concatenating histograms of each cell. In this work ORL database is used and 30 feature vectors are obtained and these vectors are used to train the SNCET and FFNN.

SNCET NEURAL NETWORK BASED CLASSIFEIR

Single neuron cascaded network architecture uses single neuron for all its single layer. The input to a neuron is inputs of the system and the outputs of the all previous layers. This is fully interconnected network provides nonlinear mapping between input and output. Each neuron in the architecture includes weights, bias and non-linear activation function. The weights of interconnections to the previous layer are called as "input weights" and the weights of interconnections between the layers are called "link weights". All hidden tan-sigmoid/log-sigmoid layers uses activation function pure-linear function is used for output layer. Initially a hidden layer with only one neuron between the input and output is trained. To create a multilayer structure similar to Multi-layer feed forward neural network, hidden layers are added one by one and the whole network is trained repeatedly using the concept of moving weights so as to obtain compact network. This process continues, till the performance index is reached. Computation complexity is high when using a nonlinear tan sigmoid function as activation function. То reduce complexity computational simple а nonlinear activation function called Elliot function used. The proposed SNCET neural network is shown in Fig. 1.The performance of the network is compared with most popular FFNN for same number

of hidden neurons in the hidden layers. The network details for SNCET and FFNN is shown in Table I. Fig. 2 shows schematic diagram of the proposed face recognition system. The proposed Face recognition system consists of grey scale images of size 112 X 92. No preprocessing is performed. A part of the ORL database is to be used for training and the rest for testing. The training images are given as input to the HOG block for feature extraction. The HOG based feature extraction outline in section II is used. From this 30 feature vectors are selected. These vectors are used as input to train the SNCET NN. То evaluate the performance of the network the recognition

accuracy is calculated and shown in Table III.

Where

p Input vector, p = [1, 2, ..., R]

- S^{*m*} Number of neurons in the layer '*m*' where m = [1, 2, ..., M] and $s^0 = p$ m Input weight of neuron '*i*' of layer '*m*' for
- $w_{i,R}^{m}$ external input '*R*'.
- $m_{w_{i,j}}^{m,k}$ Link weight of neuron '*i*' of layer '*m*' for input from neuron '*j*' of layer '*k*'.
- b_i^m Bias for neuron '*i*' of layer '*m*'.
- f^m Activation functions of all neurons in a layer '*m*'.
- a_i Output of neuron '*i*' of layer '*m*'

SIMULATION RESULTS ON FACE RECOGNITION SYSTEM

Samples of ORL database has taken for investigation. Some sample images of the ORL data base is given in Fig.4.

The performances of SNCET and FFNN are analyzed in detail. In table II, forty person recognition accuracy is shown for five samples per person is training and remaining for testing. To investigate the recognition capability of networks different number of training and testing images is taken and the results obtained is shown in Table III. In all the simulated conditions, SNCET network performance is better than the feed forward neural network. The best recognition accuracy of SNCET is 80% and for FFNN is 67.5%. Average recognition rate is 65.2% SNCET and 47.7% for FFNN .The single neuron cascaded neural network improves the recognition accuracy by 17.5%. Hence the classification capability of single neuron cascade neural network is found to be better than FFNN. The recognition accuracy obtained for both the networks are shown as bar graph in Fig.5.

CONCLUSION

This paper proposes a single neuron cascaded neural network with Elliot function as activation function based classifier for face recognition system. The ORL data base is taken for investigation and the features are extracted using HOG. These features are used to train the neural network. This network performance is compared with most popular feed forward neural network.

The architecture are designed keeping the total number of hidden neurons kept constant .The SNCET and FFNN are investigated for their performance using various combinations of training and testing data set. The highest recognition rate of SNCET network is 80%, for feed forward neural network is 67.5%. The average recognition rate for SNCET is 65.2% and FFNN is 47.7%.SNCET improves average recognition rate of 17.5% than the FFNN.

From this detailed investigation, it is concluded that the SNCET with HOG features outperforms the feed forward neural network in terms of average recognition rate. Hence the SNCET model is found to be superior in terms of recognition accuracy as compared to the FFNN. The single neuron cascading makes the network self-organizing which is not achieved using multilayer FFNN. From the investigations it is concluded that the SNCET is a good classifier for face recognition system. It has the advantage of compactness, ease in design and Identification improved accuracy. of appropriate and optimal feature set would further enhance recognition rate.

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Network Parameter	SNCET	FFNN
Number of layers	Input layer-1	Inputlayer-1
	Hidden layer- 40	Hidden layer- 2
	Output layer-1	Output layer-1
Number of input	30	30
Number of neurons at	aingla	20 neurons in
hidden layer	single	each layer
Number of output	40	40
Transfer function	Elliot	Tansig
Training function	TrainIm	TrainIm
Performance function	MSE	MSE

TABLE ISNCET AND FFNN TRAINING PARAMETERS

TABLE II RECOGNITION RATE OF SNCET AND FFNN FOR FIVE TRAIN AND FIVE TEST IMAGES

Train /Test image are five				
	SNCET	FFNN		
Person	Recognition	Recognition		
	rate (%)	rate (%)		
S1	80	20		
S2	80	0		
S3	20	20		
S4	100	60		
S5	100	80		
S6	100	60		
S7	100	100		
S8	20	20		
S9	100	20		
S10	20	20		
S11	60	20		
S12	100	100		
S13	40	60		
S14	100	60		
S15	100	100		
S16	60	20		
S17	100	60		
S18	100	60		
S19	100	40		
S20	100	60		
S21	100	100		
S22	100	100		
S23	60	60		
S24	100	60		

S25	100	40
S26	100	20
S27	60	60
S28	40	40
S29	20	20
S30	100	80
S31	60	20
S32	80	80
S33	40	40
S34	60	60
S35	0	0
S36	20	0
S37	100	100
S38	100	0
S39	100	100
S40	40	40
Average	74	50

TABLE III RECOGNITION RATE OF SNCET AND FFNN CLASSIFIER

T num imag 4	otal Iber of es are 100	Num Imag recogr	Number of Reco Images Acc recognized (gnition uracy %)
er of rainec	er of tested		recognized		
Numb images t	Numb mages †	SNCET	FFNN	SNCET	FFNN
40	360	101	36	28	10
80	320	156	107	48.8	33
120	280	168	121	60	43
160	240	167	109	69.5	45
200	200	148	100	74	50
240	160	120	89	75	55.6
280	120	91	71	75.8	59.2
320	80	61	53	76	66
360	40	32	27	80	67.5
Av	erage re	cognitior	n rate	65.2	47.7



Fig.1. SNCET Architecture



Fig. 2. Schematic diagram of proposed Face recognition system



Fig.4. Sample images of ORL database



Fig.5. Recognition performance of SNCET and FFNN

29

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A Technical Note on Electrochemical Deburring

Satisha Prabhu Research Scholar, Department of Mechanical Engineering, Email:satishaprabhu@gmail.com,satisha.pphd14@sot.pdpu.ac.in Mob: 9482254697, 9429183707 Dr Abhishek Kumar K Assistant Professor, Department of Industrial Engineering, School of Technology, Pandit Deendayal Petroleum University, Gandhinagar - 382 007 Email:abhishek.k@sot.pdpu.ac.in Mob: 07600652935, 09421249791.

ABSTRACT

Often burrs are termed as perennial thorns, real productivity killers and production engineer's headache. These burrs are the thin ridges, projections, loose metal pieces that develop during production operation like turning, milling, drilling, sheet metal operations etc. Workman injury, short circuits, and assembly problems were reported while handling parts with burrs during machining. In hydraulic and pneumatic systems burrs and metal pieces can alter the flow conditions which may result in to catastrophic failure. Among one hundred and fifty types of deburring processes, Electrochemical deburring (ECD) has proved beneficial in some critical areas of finishing of components. In absence of standardized procedure and adequate standards for removal of burrs of various shapes, dimensions and properties, electrochemical deburring (ECD) method is considered as an alternate method. In particular, deburring of internal geometry was more difficult, ECD has proved to be beneficial and inexpensive. Therefore in automation and high efficiency processes of deburring cross holes, development of ECD is considered to be of prime importance.

Electrochemical deburring is a variant of ECM (Electrochemical machining) which uses the principle of electrochemical dissolution (Faraday's Laws) to remove burr preferentially on the metallic specimen. The parts generally require insulated tool and standard fixtures for maintaining relative proximity between electrodes and supply of electrolyte. Insulation material, tool materials are varied according to work piece materials. This paper describes about the various process parameters, capabilities, relative advantages and potential applications. Detailed requirements about tooling, insulation and fixturing are dealt in detail. Also a quality control of deburring is highlighted. Several researchers' contribution as well as the use of mathematical modelling with empirical relation is presented here. Few limitations like discoloration of the deburred area, variations of radius and stray cutting are reported.

Keywords: Perennial, Electrochemical deburring, cross holes, tooling and fixturing.

INTRODUCTION

Burrs are thin ridges, projections, loose metal pieces that develop during the manufacturing operations like turning, milling, sheet metal operations, drilling and other machining process. There are several disadvantages of using parts with burrs viz human injury, assembly problems, plating build-ups, short circuits in electrical components, reduction in fatigue life, may produce friction and wear etc. In hydraulic and pneumatic systems the valves can partially or fully block the flow may disturb the entire operation and leads to catastrophic failure. [14] Removal of burrs can amounts to as much as 30% cost of the component. There are over one hundred and fifty types of deburring processes and it's variations but more often manual deburring is employed. This is labour intensive and could be very expensive process. Deburring of burrs from internal cross holes is one of the most difficult and challenging task for the manufacturers. Among one hundred and fifty or odd methods a few are concentrated on deburring of intersecting as well as cross holes and is further limited by miniature type holes. In absence of standardized procedure and adequate standards for removal of burrs of various shapes. dimensions and properties. electrochemical deburring (ECD) method is considered as an alternate method in other methods. comparison with In particular, deburring of internal geometry which is more difficult. ECD has proved to be beneficial and inexpensive. At the same time ECD has proved beneficial for deburring of internal holes and cross holes. There for high efficiency and automation of cross hole, development of this type of deburring is of prime importance. Historical overview of electrochemical method and its development is as indicated in table 1 (Appendix – 1)[08]. Various researchers have contributed to solve the burr problem by ECD viz Choi and Kim 1998 [15], Jain 2002 [10], Sarkar et. al., 2004 and explained about using CBN wheels, graphite balls with different electrolytes [20]. Ghabrial and Ebeid (1981) have mentioned about stationary machining for deburring. ECD is applicable to stainless steels and was investigated by Shome et.al (2008) [04]. Xu.et.al (2010) [17] have developed mathematical model and was able to predict theoretically deburring time and burr height variations. Pulse electrochemical deburring through а mathematical model is described by Ning et. al (2011).

FEATURES OF ELECTROCHEMICAL DEBURRING

- 1. Almost any conductive material can be deburred or polished electrolytically.
- ECD is performed in seconds and is many times faster than hand deburring. However cycle time is limited by

loading and unloading the parts during operation.

- 3. Drilling burr removal is routine and involves simple electrodes.
- 4. Interior burrs, intersecting holes and internal fins can be deburred using precisely located electrodes.
- 5. Applications: Automotive connecting rods, gear teeth, blanking dies, valve parts, punch press blanking and machined pipe fittings.
- 20 second deburring operation on automotive pistons simultaneously deburrs two oil ring slots, six piston wall oil holes, two piston pin oil holes and all weight bosses.
- 7. The absence of mechanical contact or residual stress effects permits the use of ECD on thin parts or sections without the fear of distortion or damage.
- 8. Shallow reliefs (0.76mm deep) can also be produced.

This paper highlights the features of ECD to control and regulation of hydraulic elements that require a high processing precision. Parts shown below (fig 1.0, 2.0 & 3.0) have several inside intersecting bore holes, cross holes and in the intersection areas inside burrs occur that might adversely influence the correct operation of hydraulic installation [14], the thus operational blocking might arise, by burrs being detached and entering in the hydraulic circuit of the installation. This may lead to catastrophic failure of the system. The burrs are in points that are not easily accessible and it is very difficult to remove them by any other methods, risking deteriorating the parts. A few regulating hydraulic elements are presented below that could easily be electrochemically deburred.

PROCESS DESCRIPTION

Electrochemical deburring (ECD) is a deburring process which uses the principle of electrochemical dissolution (Faraday's Laws) to remove burrs in a preferential location on the metallic workpieces. The part is to be deburred is placed in a non-metallic fixture (PVC, ABS, PTFE, NYLON, Epoxy resin coatings or moldings [19] etc. where a close proximity is maintained between the anode and the cathode.

The workpiece is positively charged (anode), and the tool is negatively charged (cathode), and an electrolyte solution (NaCl, NaNO₃ etc) is pumped at high pressure between the electrodes and the burr. The flow of electrolyte not only flush area (from the machining sludae deposition) but also maintains the electrical contact between the electrodes to remove metal. Any loose chip would definitely be creating short circuit in the system would definitely have to be removed by high velocity flow of electrolyte. As the burr dissolves, producing closely controlled radius which depends on the current density and time of deburring [18]. Fixturing is an important aspect of ECD, establishes anode which cathode relationship. A fixture may consist of nonmetallic locator which provides insulation to the part area that need not be deburred or machined. The fixture also provides a means for flowing electrolyte between tool and workpiece either in direct or indirect manner.

ECD EQUIPMENT DESCRIPTION

The equipment is smaller does not require rigid supports and is less complex than ECM machine. Plastic tables or shallow tanks are arranged to accept the fixtures and allow quick connections for electricity and electrolytes. Stainless steel tank, fixtures and fittings are used to resist the corrosiveness of the electrolytes [07]. Tooling and electrodes are tailored (with insulation) to confirm to configurations of the workpiece and internal features to be deburred. By insulating the cathode, the effects on the other exposed areas of the workpieces are reduced to negligible amounts. Power supply ranges from 50A-500A, with multiples are available if several stations are run simultaneously.

Multiple ECD fixtures for automation are frequent variations. The cycle of operation begins with closure of lid or splash guard and placement of the electrode in correct relation with the workpiece. Immediately electrolyte circulation is started with current 'on' during the cycle of operations. Flow rate can be adjusted according to the table 2 (Appendix -1) [07] depending upon the component size and quantum of areas to be deburred.

ELECTRODES AND TOOLS

The Tools shall be insulated by materials such as heat shrinkable insulating rubber sleeve, artelon tube, ordinary paint coating or epoxy resin coating. Only area to be deburred is to be exposed for electrolytic action leaving behind covered area with insulation. The electrode will be connected to electrical supply from one end while other end is used for machining of metals. The requirements need to be fulfilled by tool like corrosion resistance against electrical electrolytic, conductivity, resistance against salty water and air, and rigidity against electrolyte flow. The most common tool materials are brass, copper, tungsten, stainless steel, and aluminium either bare or coated. The brass has been frequently used as an electrode material [14] due to its physical toughness, which provides protection against damage due to tough handling, and excellent protection against short circuit damage. Copper is assumed to be having better removal rate than other tool materials. Several defects such as pitting on the surface is due to formation of galvanic cell are observed while machining.

ECD employs tool as cathode and its dimension, material, shape, structure and precision has impact on the workpiece.

Hence following principles [21] must be adopted

- i) Zone of burr must focus on maximum electric current density i.e non burr area electric current density minimum.
- ii) The cathode must provide enough electrolytes to the burr zone.
- iii) The cathode must have enough intension, orientation, assemble and unassembled conveniently and easy to manufacture.
- iv) Flow of electrolyte must be such that when breaks free, it should be washed away from the machining zone but not in to it. A free burr in to the gap may create short circuit and possible damage to the tool and the workpiece.
- v) If series of gaps to be deburred the first location burr removal should not create short circuit in other areas.

The clearance should be between 0.13mm to 1.27mm and due to big clearance the electric current can easily spread in the gap resulting in erosion of non-burred portion, if the clearance is extremely small, will easily short-circuit and destroy the accessory surface. So electrolyte must circulate in this narrow gap otherwise no machining would takes place. If the velocity flow is faster the electric current consistency is more and vice versa. Through many experimentation direction of the outlet holes, the number of outlet holes, and it's size dimension were designed and reported [21].

FIXTURE ELEMENTS

Baseplate usually made of nylon or other similar material hold the fixture elements and firmly secured to the bottom section of the machine. The material for the fixture should be electrically nonconductive, withstand chemical attack of the electrolyte and flow conditions, rigid and nonabsorbent, with stand temperature variations [14]. Main body of the fixture should have the electrolyte piping connections, mounting for the

workpiece and should maintain definite relationship between anode and the cathode. The material of the main body is also of that of base plate and must bear above characteristics. Electrode material should be insulated leaving behind the area facing the workpiece machining zone. Electrode base should be locating the electrode from one end and have electrical connectors from the other end for electric supply (-ve). The material for electrode should also have high resistance against electrolyte flow, good electrical conductivity and corrosion resistance [14]. Brass is frequently used as electrode but copper tools have removed the burr at higher rate [14]. Electrical connectors should have good electrical conductivity and resistance to salty water. Stainless steel proved to be one of the good materials for electric connections.

PROCESS PARAMETERSS

ECD machines may have current ratings from 100 to 2000A depending on the size of the component and number of workstations. Current densities for deburring is of the order of 100 to 1000A at 0-30V. Excessive amperage cause heating of the equipment [22] may necessitate air cooling or water cooling. If the high current densities are required then floating component type method can be employed. Electrolytes are usually pumped at a pressure ranging from 0.15 to 0.5 MPa at flow rate of 3 to 15 L/min for each of the 100A. The gap between the electrodes range from 0.2 to 1.2mm. Typical machining parameters are indicated in the table 2.0 (Appendix-1).Electrolytes are continuously circulated during the ECD process (anodic dissolution) has the following functions: establishes electrical circuit, remove heat and sludge during the process. The following qualities are must electrolyte: High electrical for the conductivity: low toxicity: minimum corrosive effect; and electrochemical stability. During machining a passive film

may form on component part, prohibiting metal erosion. This film can be removed by natural de-passivation and hydrodynamic de-passivation [14]. Table 3.0 (Appendix-1) provides the types of electrolytes and its relative advantages and disadvantages.

MATHEMATICAL MODELS FOR ECD OPERATION

In ECD the insulated tool is plugged in to the miniature hole, with its surface insulated thereby preventing side wall cutting or stray cutting. During machining the current density on the surface around the miniature holes increases as the burr is dissolved. Hence as the process continues the current density increases [18] correspondingly, which in turn increases the metal dissolution rate on the surface around the hole. From the above analysis, the metal dissolution increases along the height of the burr (fig 8.0) and reaches maximum.

The deburring time can be mathematically expressed as [01], $t = \frac{di^2 - do^2}{8 \text{ in } do^2} \quad (di^2 - do^2) + 4y_o(y_o - di) \dots (i)$ And base metal removal will be [01],

Δу

From the above expression (i) it is clear that for a specified burr height, the time of deburring can be theoretically predicted. The base removal is independent of the voltage, workpiece material and conductivity of the electrolyte. And it depends on initial burr height and interelectrode gap- eqn (ii).

These equations are utilized to determine burr height, deburring time and loss of base material [01] in electrochemical deburring.

COMMON METALS CAN BE DEBURRED ELECTROLYTICALLY

Aluminium – Processing time: normal. Copper – Process speed: slow. Gold – Process speed: very slow. Invar – Process speed: normal. Iron, malleable, cast - Process speed: fast. Kovar - Process speed: normal. Lead – Process speed: very slow. Magnesium -Process speed: fast. Platinum – Process speed: won't process.

Silver – Process speed: fast. Sintered iron -Process speed: very fast. Steel, carbon -Process speed: slow. Steel, cast -Process speed: fast. Steel, stainless -Process speed: normal. Titanium – Process speed: very fast or won't process. Tungsten -Process speed: very slow. Waspaloy -Process speed: slow. Zinc – Process speed: normal.

PROCESS CAPABILITIES

More often Sodium Chloride (NaCl) and sodium nitrate (NaNO₃) are used as electrolytes. Other electrolytes such as Hydrochloric acid, Potassium chlorate, Sodium Nitrite, Potassium Nitrate has its own disadvantages during the process. Comparison between two electrolyte applications are listed in the table 4.0 (Appendix-1).[24] The component after machining has discoloration effect ie localized dark grey deposit which is a reaction product. Thickness of this oxide layer is about 1 micron and this is firmly attached to the machined surface and very difficult to remove. This may be removed by suitable heat treatment [24].Typical Burr removal of aluminium and Iron Based alloys are shown in the graph.

EXAMPLES AND APPLICATIONS OF ECD

The aerospace industry represents the main customer of ECD. In jet engine, it was found that approximately 90% of the rejects for malfunctioning were due to burr related problems. When using ECD the return rate had been cut drastically, and the close high technology tolerances could be better maintained.

It can also be very well applicable to,

- Many hydraulic or pneumatic components (spool valves)
- Bearing components (high precision cage, with several holes)
- Piston pin bore in refrigeration compressors
- In automation industry ECD is applied to remove burr from: gears, gear pump housings, oil grooves in transmission shafts, fuel injectors, rocker arms, multiple row sprocket wheels, diesel engine gear plates etc.
- ECD technique was used for removing burr from ground knife edges, intersecting milled slots, intersecting drilled holes, stamped components.

LIMITATIONS

ECD processes are not suitable for machining electrically nonconductive materials. Sharp corners or definite radius cannot be obtained by ECD. The complex component with different materials will put limit on its usage [22]. Etching of the constituents, grain boundary attack, and pitting due to electrochemical action may have drastic effects on the mechanical properties of the material, particularly the fatigue strength.

CONCLUSIONS

- Amazing transformation of deburring and edge finishing technology has occurred over last 50 to 75 years. It is transformation that has largely been ignored by writers and historians.
- ii) In absence of standardized procedure and adequate standards for removal of burrs of various shapes, dimensions and properties, electrochemical deburring (ECD) method is considered as an alternate method especially in

the areas of intersecting and cross holes.

- iii) The aerospace industry represents the main customer of ECD. In jet engine, it was found that approximately 90% of the rejects for malfunctioning were due to burr related problems. When using ECD the return rate had been cut drastically, and the close high technology tolerances could be better maintained.
- iv) Mathematical models and predictions can be utilized for parametric analysis and to compare the results with experimental data.
- v) However some limitations observed in the areas of complex geometry parts with multiple components.

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Fig 1.0 Safety valve with nitrogen [14]1. Valve body; 2. Piston; 3. Valve sleeve;4. Sealing ring; 5. Fixing cover



Fig 2.0 Controlled direction valve normally open [14]

 Bored plug; 2.Valve body; 3.Spring guiding;
 Valve seat; 5. Intermediary Sleeve; 6. Sleeve; 7. Gland; 8. Spring-Disc; 9. Control rod; 10. Pass through sleeve; 11. Sealing taper; 12. Piston



Fig 3.0 Fixturing for deburring by the electrochemical method: [16]

a. For impellers of axial pumps; b. For impellers of centrifugal pumps;

1. Workpiece; 2. Cathode tool; 3. Fixture base; 4. Bell-mouth for the cathode device; 5. Installation.



Fig 4.0 Schematic of mechanism of Electrochemical deburring and radius generation [22].







Fig 6.0 Tooling for electrochemical machining deburring. [22]

a) Valve casing. b) A fragmentary schematic of the production jig.



Fig 7.0 Schematic arrangement of an EC-deburring fixture. [22]

1. Base plate; 2. Electrolyte Connection; 3. Tool Electrode; 4.Current Connection; 5. Workpiece Holder; 6. Work piece; 7. Current Contact; 8. Contact spring; 9. Current connection;



Fig 8.0 Schematic of Deburring Mechanism (Electrodes, work piece (+ve), tool (-ve))

39









Source: Machining data hand book (3rd edition, 1980) [07]



Fig 11.0 Some of the typical examples of components deburred by ECD [12].

APPENDIX-I

Sr. No	Year	Description	Researcher/year
01	1945	Electro polishing used for deburring	1945
02	1952	First learned Journal published paper on deburring	Hisao, Suda, Kadowaki, and Tanaka - 1952
03	1953	Electro polishing use for deburring documented in trade magazines	Anonymous 1953
04	1963	Electrochemical deburring used commercially	Anonymous 1963a
05	1963	One of the first studies on drill burrs is reported	Bell and Kearsley 1963
06	1963	Electrochemical deburring developed	-
07	1966	Electrochemical vibratory deburring developed	1966
08	1970	Electrochemical vibratory finishing patented	Anonymous 1970a
09	1974	First cumulative bibliography of deburring literature published by SME	Gillespie 1974d
10	1975	Land Mark paper on impact of part design on burrs and deburring	Schafer 1975a
11	1975	Land Mark German book on burr formation and deburring	Schafer 1975b
12	1977	One of the first efforts to define burr related terms	Gillespie 1977a
13	1977	First comprehensive look at side effects of deburring processes	Gillespie 1977b
14	1977	First standard for defining edge conditions	Schafer 1977
15	1977	First extensive review of deburring processes in trade magazine provides widespread overview of the major processes and issues	Drozda 1977
16	1980	First Japanese book on all deburring processes	Takazawa 1980
17	1998	Micro burr technology begins	Ko, Lee and Jun 1998
18	1999	Most comprehensive English language book on burrs and deburring published	Gillespie 1999
19	2000	A 350 page guide to deburring products published	Baron 2000
20	2004	History of burr technology contributors published	Gillespie 2004

Table 1.0 History of Electrochemical methods and developments [08].

 Table 2.0 Process parameters Source: Machining data hand book (3rd Edition, 1980) [07]

Power supply	
Туре	Direct current
Voltage	4 to 25 V
Current	50 to 500A (approx 10-15A per
	25mm linear)
Gap	0.13-1.27mm (generally 0.76mm)
Electrolyte types	
Frequently used	120-240g/LNaCl
Most used	240-360g/L NaNO ₃
Rarely Used	240-480g/L NaNO ₂
Rarely Used	240-480g/L KCL
Temperature	32°-42°C
Pressure	100-350KPa
	6.1
Flow	4 to 15 L/min per 100A
Filters	10 to 75 microns
Electrode Materials	Brass or Copper

Electrolyte	Field of	Concentration	Advantages	Disadvantages
type	application	_	Ŭ	J
Nacl	-Steel -Cast Iron -Aluminium alloys -Copper alloys -Nickel alloys -Cobalt alloys -Molybdenum alloys -Titanium alloys	30%	-Cheap -Nonflammable -Non toxic	- Large working interstice -Intercrystalline attack action -Conductibility depends on temperature
H_2SO_4	-Steel	10%	-Use for very small diameter holes	-Expensive -Corrosive -Consumed during work
NaCl +NaOH	Metal carbides	15% NaCl+3% NaOH	-Very hard materials used	- NaOH is consumed during the work
NaCl+NaOH +NaNO3	-Wolfarm -Wolfarm Carbides	5%	-Hard materials are used	- It is consumed during the work

Table 3.0 Electrolytes for various metals and its composition [14].

Table 4.0. Process capabilities of NaCl and NaNO₃ during ECD [24].

Sr.No	Details	Sodium Nitrate	Sodium chloride
1	Voltage	High	Low
2	Reaction	Normal	Aggressive Slow
3	Increase in PH Value	Fast	Slow
4	Machining Efficiency		
	Low Carbon steel	60-80%	80-100%
	High Carbon Steel	Good	Poor
	Aluminium	Good	Poor
5	Machined Surface		
	 Roughness 	5 micron	1 micron
	• Colour	Dark grey	Bright grey
	• Edges	Sharp and distinct	Blunt & Dull
	Dimensional Accuracy	Accurate	Not accurate
	 Reach Effect on Surrounding Surface 	Up to 1 mm Limiting stray machining and pitting of adjacent areas	Up to 5 mm Removes material from surrounding areas and pitting damages adjacent
			areas.
6	Economy	Expensive	Not very Expensive

Buying Behaviour of Smart Phones Among Undergraduate Students

Anish John A Research Scholar Bharathiar University Coimbatore- 641 046 Tamil Nadu, India. Email id: anishjohna@gmail.com Dr.C.Sengottuvelu, CPM(ISM-USA) Professor & Doctoral Research Supervisor SCMS Cochin School of Business Prathap Nagar, Muttom, Cochin-683 106 Kerala, India.

Abstract

This research paper reveals that the consumer behavior of college going students with special reference to buying behavior of smartphones. Youth in this modern era, related with their intention to get access to information quickly. So, a smartphone is a popular gadget that used by many people, especially in the younger generation to maintain their social relation and to get information. Youth usually have the intention to buy something not just based on their needs, but also something that's become a trend and easy to being influenced by their friends or suggestion from family in their purchase decision. The purpose of the present paper is to explore the different factors of consumer buying behavior in purchasing smart phone and their preference among college students. This study is to analyze the effect of price, brand, product features and social influence affecting the purchasing behavior of smart phone among the college students. This study uses demographic factors and independent variables of price, brand, product features and social influence on the purchasing decision. In the present study a sample size of 500 undergraduate students from different colleges have been covered, who have purchased the smart phones within one year of time . The convenience sampling method will be employed to identify the respondents for the purpose of study. Data is collected with the help of a questionnaire. Descriptive research design is used for this study. Independent t test, factor analysis, descriptive statics was used to analyze the data with SPSS. This study reveals the findings that the price, brand, product features and social influence are the significant factors influencing the college students to purchase a smartphone. It is expected that the findings will provide lighter inputs to marketers in framing their marketing strategies. Further, it provides an exclusive viewpoint on buying behavior of smart phone among college students.

Key words: Smartphones, product features, brand, buying behavior, college students

INTRODCUTION

Today's smart phone is taking the role of the computer, making it possible to do a lot with this small hand-held device. This research is intended to describe and analyse the buying behaviour of smart phones among undergraduate students. The Commercial Mobile Phone was introduced by Motorola back in 80s and the First Smart phone was introduced by IBM in the early 90s. However Mobile was affordable for almost everyone at that point of time. But the recent trends in technology in the past one and a half decade has significantly reduced the price of smart phones making them Cheap and accessible. And today, when we analyse the age group of the customers who buy smart phones, it can be seen that the majority of the Group belongs to Student Community.

In the past few years, technological development in mobile phones has totally changed the ways we access, share, and create information. Within the academic environment, Surveys reported that 63% of 2016

North American undergraduate students now have an internet capable smart phone or mobile device including Blackberry, iPhone, iPad, Android. More than half of them said that they accessed the Internet through their devices on a daily basis to read and send e-mail, check the news and weather, use GPS, get maps and directions, and access social networking sites like Facebook and Twitter. A smaller, but growing group, also used their phones to do online banking, shop, or download and stream music and videos. Smart phones provide digital voice service as well as text messaging, e-mail, Web browsing, still and video cameras, MP3 player and video viewing smart phones can run multiple applications, turning the once single-minded cell phone.

University students tend to adopt electronic devices earlier compared with other demographic groups. They are the latest to Check out the technologies which are released in the market. The smart phones market data indicate According to the report by Pew Internet (Smith, 2011), younger people tend to adopt a smart phone earlier than older people. Furthermore, а report from е marketer (2012) shows that 61% of university students owned a smart phone in 2011. This higher smart phone adoption rate, university students than among people in other age groups, indicates that a large portion of the early adopters of smart phones are university students. The spectacular increase of smart phone possession among university students over a relatively short period of time was also noted.

This higher smart phone adoption rate, among university students in North America is also prominent in emerging nations. It has been observed that a large portion of the early adopters of smart phones are aged 18-29 years-old. A huge gap in age group and ownership of smart phone is noted in every country that was pooled, consumed with age under 30 were found more likely to own a smart phone than another. In China, 69% of 18-29 yearold were having a smart phone, so as more than (62%) in Lebanon, Chile (55%), Jordan (53%) and Argentina (50%). Further, it was also noted that the education of the owners is also related to the ownership of smart phones. In the surveyed nations, those with a university degree are more likely to own a smart phone. This is especially true in the Middle East. A huge gap is also noted in China, where 83% of university graduates owned smart phone.

According to Dodds and Monroe (1985), purchase intention is a behaviour tendency of a customer who is intended to purchase a product. The success of the market or the failure depends on the purchase behaviour of consumers. The recent spike in the purchase and use of Smart phones by the Students is makes it utmost important to study the purchase behaviour of Students when it comes to Gadgets and Smart phones.

NEED FOR THE STUDY

An understanding of purchase behaviour of consumers towards smart phone is essential. Today's children are using smart phone like games, songs, videos. So their studies are physical, etc.). The consumer is the nerve centre of the modern marketing, understanding his behaviour is quite essential for efficient and effective marketing management.

RESEARCH OBJECTIVES

The main objectives of the study are:

- To analyse the buying behaviour of undergraduate students with respect to technology.
- To analyse the buying behaviour of undergraduate students with respect price.
- To analyse the buying behaviour of undergraduate students with respect brand.

• To analyse the buying behaviour of undergraduate students with respect social influence.

REVIEW OF LITERATURE

Tanzila. Ali Akbar Sohail and Nazish Tanveer (2015) have done a research on buying behavior of smart phone among university students in Pakistan. The purpose of the study is to analyze the effect of price, brand, product feature and social influence on the purchasing behavior of the smart phone among university students in Pakistan. The factor analysis results show that there are 4 factors that are affecting the buying behavior of the consumers namely- product features, Brand name, Pricing of the product, Social Influence. The result shows that purchasing the Smart phone among B school students are not associated with their gender.

Alexander Wollenberg and Truong Tang Thuong(2014) carried out an empirical research on Consumer Behavior in the Smart phone Market in Vietnam. This paper discusses the factors involved in deciding on a particular type and brand of smart phone in HoChi Minh City, Vietnam's largest city. First, the study uses demographic factors and independent variables of Advertising, Perceived Quality, Word of Mouth, and Price and their impact on Brand Perception and the resulting strength of brand perception on the purchasing decision (dependent variable).Second, the study also connects each independent variable directly to the Purchasing Decision and thus compares the importance of each independent variable individually on the purchasing decision to frame the relative importance of brand perception. The findings showed that all the independent factors are related to the dependent factors.

Dr. Monica Sainy (2014), studied the buying behaviour of smartphone among b school students and the major objective of this research is to identify the factors

influence the students to purchase smart phone. This research reveals the fact that Product features, Brand name, Pricing, Social Influence & Demand are the most influential factors in purchasing smartphone.

Shadan Vahabzadeh, Soheila Saedar Duneghe, Tahareh Ataei Khachoei(2014) in their study focused on the factors influencing the consumers' dependence upon smart phones, and the effect of factors on the purchase behavior of Iranian consumers. The study revealed the fact that students' dependency on the smart phones had the greatest influence on their purchase behaviour in the future.

Surendra Malviya, and Manminder Singh Saluja, (2013), studied the factor Influencing Consumer's Purchase decision towards Smartphones in Indore", the major objective of this research is to identify the key factors which have a dominating effect on the consumers' minds while making a purchase of smart phone. This research provides new marketing dynamics to the leading mobile companies for a market.

RESEARCH METHODOLOGY Design of the study

The present study is employed with exploratory in nature during pilot testing of the questionnaire and descriptive nature during full scale collection of data.

Data Collection:

Primary data were collected by administering questionnaires to undergraduate students (boys and girls) and secondary data collected through various books, magazines, journals etc **Sampling Technique:**

In the study convenience sampling technique was used.

Sample Size:

The study was restricted to five colleges affiliated to Kerala University only. The questionnaire was administered to

500samples covering 250 boys and 250 girls.

Sampling Unit:

Sampling Unit was the undergraduate students from five colleges affiliated to Kerala University with more than a thousand students doing their under graduation courses

Statistical tool and Technique:

Descriptive statistical tools such as ttest, regression and correlation and factor analysis were applied for analysis by using SPSS and MS Excel.

Limitations of the Study:

- The study was confined to undergraduate students only.
- The study was limited to colleges selected from Kerala University.
- The data collected from the samples may not be completely appropriate.
- The study was limited to few factors influencing purchase decision.

FINDINGS AND CONCLUSION

The major findings are:

- All the respondents (100%) have smart phone.
- It has been observed that most of the female students (32%) belongs to science category and male students (64%) belongs to arts category.
- Majority of the respondents both male (57%) and female (59%) were in the age group category of 18-20.
- Majority of the male (77%) and female (77%) respondents have only one siblings.
- Most of the students have Malayalam as their mother tongue
- It has been observed that the majority of the respondents both male (75%) and female (80) have only one smart phone.
- Majority of the respondents were using smart phone from 1-2 years.

- The female respondents were using smart phone in the price range between 5000-10000 and male respondents in the price range between above 10000-15000.
- Product features (75%) have strong influence to purchase smart phone.
- Brand (75%), Social influence (68%), price (72%) and product features (69%) strong influence among students to purchase smart phone.
- Website (33%) is the main source of information among students before they purchase smart phones.

CONCLUSION

In this modern era, smart phone is just not only the want but also a need .All the respondents mentioned that they have smart phone. This shows that it changed the ways that people live, communicate and connect people all over the world. Smart phone has made people smarter by organising their lives with a single device. Product feature, price, Brand and Social influence are the most influencing factors among students to purchase smart phone. They are using it for their personal and also for their study related purposes.

SCOPE FOR FUTURE RESEACRH

It would be very interesting to conduct another study within the same area of research with the incorporation of all the youngsters and include all the factors influencing them to purchase a smart phone which will give the more integrated result to the topic.

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Table -1 Gender				
GenderNo. of respondents in ArtsPercentage of respondents in 				Percentage of respondents in Science (%)
Male	89	35.6	161	64.4
Female	81	32.4	169	67.6



Table-2

Candar	No. Of	Percentage of	Number of	Percentage of
	respondents	respondents	respondents of	respondents of
Gender	between Age 18-	between Age 18-	Age more than	Age more than 20
	20	20 (%)	20	(%)
Male	144	57.6	106	42.4
Female	148	59.2	102	40.8

DATA ANALYSIS & INTERPRETATION

February



Table-3 Number of Siblings

Gender	Number of respondents who have only one Siblings	Percentage of respondents who have only one Siblings (%)	Number of respondents who have more than one Siblings	Percentage of respondents who have more than one Siblings (%)
Male	193	77.2	57	22.8
Female	194	77.6	56	22.4



Mother Tongue

	No. of	Percentage of	No. of	
	respondents	respondents	respondents	Percentage of respondents
Condor	having having		having Other	having Other
Gender	mother	Malayalam as	Than Malayalam	Than Malayalam as their
	tongue as	their mother	as their mother	mother tongue (%)
	Malayalam	tongue (%)	tongue	
Male	244	97.6	6	2.4
Female	244	97.6	6	2.4



Table-5 Parents Employment Status

Gender	Father\Mother Only Employed	Father\Mother Occupied (%)	Both Employed	Both Employed (%)
Male	106	42.4	144	57.6
Female	120	48.0	130	52.0

45

Multidisciplinary International Academic Research Conference

February



Table-6 Respondents have smart phone

Gender No. of respondents have Smart phone		Percentage	
Male	250	100	
Female	250	100	



Table-7 Number of Smart phones

Gender	Only One Smart phone	Only One Smart phone (%)	More than One Smart phone	More than One Smart phone (%)
Male	187	74.8	63	25.2
Female	199	79.6	51	20.4



Table-8Number of years owning smart phones

Gender	Less than 6 months	more than 6 months - 1 year	1-2 years	2-3 years	3-4 years	4-5 years	more than 5 years
Male	3.6	34.8	38.8	12	6	3.6	1.2
Female	4.8	26.4	35.6	22.8	9.2	0	1.2

47

Multidisciplinary International Academic Research Conference

February



Table-9

Price

Gender	5000 -10000	Above 10000 - 15000	Above 15000
Male	37.6	39.6	22.8
Female	43.2	34	22.8



Table-10 Product Features

Small	Average	No	High	Very High
Influence	Influence	Influence	Influence	Influence
3.016	11.526	10.866	38.406	36.186



Table-11 Factors influencing purchase

	Strongly Non Influential	Non Influential	Neutrally Influential	Influential	Strongly Influential
Product Feature	2.3	10.5	17.2	38.6	31.26
Brand	2.7	7.8	14.9	35.9	38.06
Price	3.0	9.4	16.2	38.6	32.08
Social Influence	4.1	12.0	15.6	38.0	30.16



Table-12 Source of information In store Word of Mouth Social Media Website Television Newspaper Displayable 2.2 32.6 25.4 4.4 9.2 26.2



A Study on the Performance of Textile Sector in Tanzania-Challenges and Ways Forward

Keregero Chirongo Moses.

Glorious Sun School of Business and Management, Donghua University Shanghai (PRC) Email <u>kchirongo@yahoo.com</u>

Abstract

Tanzania's textile sector has passed through various stages since independence to date, from a period where most of the textile industries were owned by the government to the period where private companies are the main owners. Thus the present paper assess the evolution and performance of textile sector before and after trade liberalization with focus on the current challenges facing the sector and the ways forward to boost the sector.

The growth of any country economy depends on the country's investment on industries and its ability to export finished goods to other countries, as the result of this the present paper has tried to assess the performance of textile sector in Tanzania and has used secondary sources to gather data relevant for the study, various literatures concerning the problem were used during the study so as to examine the development of the sector.

The present paper pinpoints the current problems facing the sector, the research results shows that the development of the sector is not impressive as most of the stakeholders in the industry are now quitting the market due to various reasons such as trade policy which has allowed the influx of cheap second hand clothes and other imports. Furthermore the present paper suggests some measures to be used to boost the sector.

Keywords: Textile sector, trade liberalization, second hand clothes.

INTRODUCTION

Tanzania is among the country in Africa and the world which manufacturer's textile products. Since its independence, 1961 Tanzania invested heavily in textile industry so that it could satisfy the demand of the market in terms of clothes and the cotton growing in Tanzania. According to the Ministry of Industry and Trade 2004 report on Status of Textile Industries in Tanzania, 50 textile industries were established by the year 2002 by the government and private companies. However only 23 (46%) of the established industries started operating. The industries are involved in dyeing, spinning, wearing, printing Kanga, bed sheets, garments, knitting, woven blankets and socks.

Despite the fact that textile sector in Tanzania is still in its infancy, according to Tanzania Cotton Board it still leads the East African countries in the export of textiles and apparel to the European Union, with annual average exports worth €14m over the nine year period, 2000-2008. However, the leading Eastern and Southern African country exporters of textiles and apparel to the European Union market are respectively Mauritius, Madagascar and South Africa, with such exports worth respectively €456million, €229million, and €170million. In 2008 on the other hand Tanzania's textiles and apparel exports to the USA market amounted to a paltry USA\$ 2million compared with USA\$ 340million for Lesotho, US\$ 279million for Madagascar, and USA\$ 247million for Kenya.

This study intends to investigate the performance of textile sector in Tanzania. This paper is organized into different aspects including cotton production and development, development of textile industries, challenges and finally the researcher suggested the ways which can be used to accelerate the development of textile sector in Tanzania. Methodology and data

Secondary sources of data have been used to carry out the study. The study has covered various literatures on textile industry including various papers and journals to find out different issues related to textile. Most of the data has been collected from Central Bank of Tanzania and Tanzania Cotton Board.

Conceptual framework

The conceptual framework of any study cater as a visual or written product one that explains, either graphically or in narrative form, the main things to be studied, the key factors, concepts, or variables-and the presumed relationships among them. For this study as described earlier the variable of principal interest is to assess the performance of textile sector in Tanzania which is influenced by various factors which fall under financial, technical, administrative, marketing and policy parts. For this case the current paper has organized his work in different paces including the cotton production, trade liberalization policy which allowed the importation of second hand clothes and the current plunges affecting the textile sector.

Tanzania Cotton production and development

Cotton production and related downstream manufacturing industry plays a crucial role in Tanzania's economy. Cotton has been grown in Tanzania for more than 120 years. It is one of the major traditional crops; others are coffee, tea, tobacco, cashew nuts, and sisal. In the year, 2005- 2009, among the traditional cash crops, cotton generated the highest foreign exchange earnings, averaging US\$ 92.0m per annum, compared with US\$ 89.7m (tobacco), US\$ 88.6m (coffee), US\$ 42.2m (cashew nuts) and US\$ 32.m (tea)(URT,Economic Survey 2009).

Nearly 500.000 Tanzanian smallholder farmers are involved in the production of cotton, and it is estimated that the crop contributes to the livelihoods of up to 40% of the population, or 16 million people. Yields, at 562 kg per hectare, are very low by international standards and the seed cotton bought by the ginners is often of poor quality or badly contaminated. The majority of Tanzania's cotton (99%) is grown in the Western Cotton Growing Area (WCGA), including Shinyanga (60%), Mwanza (25%), Mara (8%), Tabora (4%), Kagera (2%), Singida and Kigoma. The Eastern Cotton Growing Region (ECGA). including Pwani. Morogoro, Iringa, Tanga, Manyara and Kilimanjaro, produces less than 1% of national production (as seen in appendix 1 attached)

Currently, the selling of seed cotton is a largely competitive process, and one marred by inefficiencies. The ginneries have buying posts in the main cotton production villages, and farmers either sell directly to them, or to agents who consolidate the cotton and sell it on. In many regions, a number of gins have buying posts in the same area, and then compete to buy cotton from farmers – often exceeding the price predetermined and regulated by the Tanzania Cotton Board

As with most countries in Africa, the bulk of Tanzania's cotton production (in excess of 70%) is exported as lint; a key concern of the government at present. Indeed, textile and garment manufacturing is one of the key sectors outlined in the national government's Integrated Industrial
Development Strategy, testament to its status as a highly labour-intensive industry, which can incorporate value added yields of between 500% and 600% in its value chain.

Current domestic cotton production averages 700,000 bales per annum, equivalent to 126,000 MT of cotton lint; with yields at around 760kg/ha of seed cotton, or 260 kg/ha of lint cotton.

Table 1 attached at the end of the article shows the cotton production and trends between 2001/02 vield to 2008/09. The table shows that the annual production of cotton in the country, it reveals how the production of cotton fluctuates in each year. Despite the fact that the country has good arable land for cotton growth and availability of cheap labour but there are limiting factors which hampers the farmers such as persistent droughts, numerous small - scale farmers with limited access to and knowledge in application of new and improved technologies on the farm. poor infrastructure for inputs distribution and crop procurement, Inadequate research and extension services.

Moreover according to the data captured from Bank of Tanzania reveals that the exports of traditional products including cotton has declined by 10.8 percent to USD 791.7 million in the year endina December 2014, driven bv decrease in both export volume and prices. Notably exports of cotton has decreased in volume due to that most of the peasants are now withdrawing from the production of cotton and also it is attributed by the decline of the price of cotton. Table 2 attached at the end of this paper depicts a three-year performance of traditional exports including cotton.

Textile sector development before and after trade liberalization.

Soon after independence a number of textile and garments firms were

established with the most rapid expansions being undertaken between 1970 and 1986.However available statistics indicate that they were more than 135 companies in garment sector employing ten or more persons (USAID-CTI, 1994).Most of these firms were established on the basis of domestic and market considerations export and commercial profitability. However the garment industry in particular faced an acute contraction and stagnation in terms of productivity and employment.

The number of large and medium firms declined from 66 in 1980 to 53 in 1990 and in 1995 less than 30 active garment industries in formal sector. The performance of sector kept changing; this was due to trade liberalization policy which opened free trade with other countries. The contribution of the garment industry aross value added to the total manufacturing value added declined considerably from 2.8% in 1980 to about 1% in 1986 and further to 0.2% in 1994.During 1980-1984 periods, capacity utilization averaged to 25% with the public garment firms performing better than private small firms, the widened access to foreign exchange enabled the public firms to import as many raw materials and spare parts as desired.

Thus prior to the reforms of the 1990s, the sector was thriving, but faced with the withdrawal of government support, removal of trade barriers and the full rigours of international competition, it soon collapsed. Manufacturing plants were sold off by the government to private investors, who have rebuilt the industry since the early 2000s. Much of the equipment bought at this stage was antiquated and inefficient, making it difficult for these companies to be internationally competitive; а major constraint they now face. Indeed, where companies have upgraded or replaced

their equipment, it has inevitably been second- or third-hand, and for the most part globally uncompetitive; leaving the industry under great pressure and at considerable risk.

In the 1960s and 1970s, Tanzania was able to meet the demand of the market in terms of clothes. The industries produced adequate clothes and materials for making clothes. Furthermore the industries were of the major employers and contributor to GDP. It employed about 25% of the working force and contributed 25% of GDP in manufacturing sector (SAILIN LTD (TIB1996).

Though the textile industries were able to satisfy the market but it could not meet the demand of some types of clothes such as suits and suiting materials and other specific dress materials. This was due to the lack of technology of producing them.

From 1980, the economy of the country started to decline. This also affected the textile industry. The capacity of the sector to produce adequate with good quality garments decline. At the same time the government continued to restrict the importation of goods including clothes. This limited the availability of the clothes. As a result individuals started to print batik and tie and dye.

challenge great in the А development of textile sector was seen in 1994/95. The sector collapsed due to poor government economy and policies emanating from the liberalization policy, the policy allowed free trade and thus there were a great influx of clothes from other countries. Various researchers have described that the collapse of the textile industry was also due to inadequate supply of cotton lint, lack of power/power interruptions, high power tariffs, unfair competition from imports and devaluation of Tanzania shilling hence difficult to buy spare parts for the machines.

Importation of second hand clothes.

From 1980-1985, Tanzanian's experienced a shortage of goods including clothes. As it has already being mentioned that local initiatives of producing clothes emerged (batik and tie and dye) but with a poor quality and also expensive to the extent that

not everybody could afford. Some people (rural areas e.g. Southern part of Tanzania) decided to wear sacks. The sacks became shirts and skirts or something to wrap-up. In order to fill the gap, some businessmen/women started to smuggle in second hand clothes famously known as "Mitumba". It is at this time, the second hand clothes became important and its status was raised.

The second hand clothes in Tanzania arrived and sold to retailers in bales. Despite the fact that second hand clothes started to enter Tanzania before and after independence but they were imported mainly by charitable organizations and Churches for donating to the needy people.

During the crisis of the economy and the decline of performance of the textile industry sector the used clothes became very popular. They were no longer only for the poor people but they were wanted by all categories of people.

After the liberalization of the economy, the importation of second hand clothes was no longer restricted. The businessmen need to get importation license and pay all relevant taxes to the government. According to the survey carried out by Caritas Tanzania, most of hand clothes imported second by businessmen/women are from USA and member countries of European Union. The Charitable Organizations in Tanzania apply for second hand from charitable organizations and individuals in European Union and USA. The Charitable Organization in these countries exports

them to Tanzania. The charitable Organizations are exempted from taxes since they have to provide free of charge to the beneficiaries, sometimes the charitable organization sells them to other charitable organizations at a lower price in order to meet transport and clearing cost. However in October 2003, Tanzania bureau of Standards (TBS) the agency of the government of goods banned the importation of the used under wear due to health risks and ethics of Tanzania traditions.

According to the study done by Kinabo on the textile industry and second hand clothes in Tanzania, the study revealed that despite the fact that the market for used clothes is still high but now there is substitution of cheap new clothes from Asian countries and also there is attitude of change among the Tanzanians. More over the Information communication and Technology Section of the Ministry of Industries and Trade (2004) carried out an analysis of the value of importation in comparison to the other textile. The analysis revealed that the importation of used clothes was 35.16%in 2002 and 31.0% in 2003 of all textile imports, however the importation of used clothes decreased by 13.9% while the new clothes increased by 0.5% in the year 2003.

According to the study done by Semboja H & Kweka J (1998) on Import liberalization, industrialization and garment technological capability on industry in Tanzania the study revealed that import liberalization policies have generally had a negative impact on development of garment industry, also the trade liberalization policy did not address the question of how to treat factors such as dumping, underinvoicing and export rebates as they related to garments entering in Tanzania.

Furthermore, by comparing the data on status of textile industries according to the Ministry of Industry and Trade 2004 report which showed that only 23 industries (46%) of the established 50 industries in year 2002 were operating with those 135 industries established before trade liberalization it reveals that the performance of the garment industry is not impressive and therefore government need to reform the manufacturing sector. **The current constraints and challenges facing Textile sector**

There are many constraints and challenges facing textile firm in Tanzania. The researcher revealed that generally all firms confront these obstacles

Technical challenges

Development of any manufacturing sector is highly contingent on technological change. Only technology improvement can enhance output without necessarily increasing the amounts of other inputs. In this context, the following problems have been identified.

Unreliable power supply

On the technical front, one of the leading concerns of the manufacturing industry is the power supply. Indeed, during the past ten years the supply of electricity has been unpredictable. Frequent power rationing, interruptions and low voltages have been responsible for their underdevelopment and the underperformance of the sector. Furthermore, electricity tariffs have almost doubled from US\$0.07 per Kwh in December 2007 to US\$0.13 per Kwh by January 2012. Compared to an average rate of US\$0.05 per Kwh in other developing countries such as, India and Brazil, this makes it impossible for locally produced products to compete in either domestic or foreign markets.

On the other hand, the government has plans to improve the power supply and there is ample potential for future

55

energy production. But such plans need to be launched with judicious investments in energy. Currently, most textile producers in Tanzania rely heavily on electricity from the national grid supplied by TANESCO which is easily affected by the vagaries of weather.

Old machines and equipment

Outdated machines and equipment, and the inability to access timely new technology are revealed by a number of textile firms as a serious hindrance. Obsolete machinery needs constant costly maintenance and repair, which has multiplier effects on the competitiveness of manufactured goods. Although some manufacturers had made attempts to adopt new technology, several had not been able to use the state-of-art technology prevailing elsewhere especially in the advanced world and emerging economies of South East Asia. The solution to this challenge should come from both the manufacturers and the government through policies that support the acquisition of new technology, some of the firms have even failed to buy advanced equipments because of small capital they have.

Skills and knowledge

Skills and experience are very dimensions important for workers efficiency within the firm. In Tanzania there is lack of formal training institutions offering specialized courses in textile sector. This forces them to seek training abroad at high cost, or to hire young professionals not yet specialized. Low technical skills affect machinery operations and service. The quality of manufacturing products could be improved with investment in research and development activities; yet inadequate resources are allocated to research and development for various reasons, either because of shortage of financial resources or ignorance of the role of research and development in the improvement of quality

(upgrading), efficiencv and market expansion. In-house training programmes are only arranged when there is a need for workers' orientation to new technology. As the majority of firms do not put a lot of emphasis on training and upgrading, the level of skills in the manufacturing firms is low. To solve the problem in 2011 College of Engineering and Technology of the University of Dar es Salaam started offering a full BSc degree course in Textiles and Clothing, with assistance from the Department of Materials at the University of Manchester, a first intake of 18 students was made in October 2011 a significant reduction from the 32 that originally applied, but couldn't get places due to delays in financing from the Student Loan Board.

Information and communication technology

Nowadays, information and communication technology (ICT) is a prerequisite for any business to function effectively. ICT has made the convergence of audio-visual and with telephones computer networks possible through a single inter-phase. There are large economic incentives for using a single unified system for management, production and distribution. Industries that have not managed to automate their systems lag behind and are comparatively inefficient. In the current world manual operations and management are deemed old-fashioned. But because automation requires reasonable human financial and resources, and may at times entail changes in technology, manv enterprises manufacturing have not undertaken such a radical reformation. This has an adverse effect on the competitiveness of these firms once they international markets enter where efficiently produced high-quality goods sell at lower prices.

Administrative challenges

Administrative issues range from macro level (policy dimension) to micro level (firm-specific administrative conditions). In the policy arena, it is argued that textile sector is hindered by ineffective policies and, in particular, by poor enforcement of rules and regulations, rent-seeking and other weaknesses. This undermines preservation of the skills and knowledge that have been acquired through experience and learning-by-doing. The following have been revealed under administrative challenge.

Poor enforcement of laws, rules and regulations

There are several policies that concern requisite production and sales of manufactured qoods. Notwithstanding these requirements, competition from lowpriced imported counterfeits is seen as a serious problem. Tanzania is one of the where sub-standard countries manufactured goods are sold alongside the domestically-produced quality goods. Although laws do exist, loopholes make the import of these low-priced goods possible, with dire consequences for the domestic manufacturing enterprises. If Tanzania's manufacturers comply with the required quality standard, it cannot compete with the low-priced imports, and the emerging enterprises have called on the government to take extensive measures to curb this impasse so as to reinstate level playing field.

Negative attitude against consumption of locally produced goods

In Tanzania there is a tendency for consumers to be more skewed towards the consumption of imported goods rather than the domestically produced. Manufacturers argued that both public and private consumers have not given domestic goods their due weight, thereby adding an unnecessary burden on the domestic firms. The contention is that

some imported goods, although of lesser quality, sell at higher prices than domestically produced items. Manufacturers stressed that the procurement policy of public institutions and even private entities has to favour commodities produced in the country. Imported goods should be considered only when there is shortage of the required products within the country. Nurturing an attitude towards the consumption of Tanzanian produced commodities is a strategic way of boosting domestic markets. Domestic products must be at the top of the shopping list except when buyers are totally convinced that there is a reasonable difference in quality. The prodomestic attitude should be propagated not only to institutions but also to the general public to enable Tanzanians create markets and jobs for themselves.

Employee's compensation and work morale

The research has identified that employees in textile firms are not satisfied with the salaries and wages. This challenge is in the manufacturing domain and should thus be resolved by the relevant management. If remuneration is low, worker morale is undermined, having an adverse impact on productivity. In a growing economy like Tanzania, issues related to compensation are to be expected, but the solution is with the firms to ascertain that sufficient allocations are made for incentives.

But it also became apparent that some of the manufacturers have concerns regarding worker attitude and culture; despite adequate compensation, people occasionally slack, and do not give their best effort. This problem cannot be downplayed: work attitude is one of the cultural aspects of a society, thus measures have to be introduced to nurture the right mindset among the country's professionals with respect to time management and work attitude. The government, enterprises, academic institutions and other stakeholders have an interest in moulding worker behaviour, usually a gradual process. If workers advocate for higher pay, they should also be ready to exert greater effort to achieve maximum fulfilment of the firm's goals.

Poor customer service and marketing strategy

With respect to marketing, this study noted that customer service was unsatisfactory in most of the textile firms. this is the challenge which affect most of the manufacturing firms . Responsibility for this issue is in the domain of the manufacturing firm management. Manufacturers have called on public and private entities as well as all Tanzanians to favour domestic goods, but they should also make a concerted effort to capture new market niches through advanced techniques marketing and strategic treatment of their customers. Consumer influenced sovereignty can be by distribution channels if they are effective enough to outweigh foreign suppliers who will win favour, for example, with good customer service. Industrial firms may need to take deliberate steps to train personnel so that these have the competence to help expand and sustain clientele.

Financial challenges

Textile firms in Tanzania have several financial challenges, including access to financial resources and high cost of capital. A few of the issues highlighted by the firms include the following:

High cost of working capital

Manufacturers considered the access costs to working capital to be too high. Most firms depend on loans from banks and other financial institutions for the running of their day-today administrative and production activities. Indeed, interest rates charged by these

financial institutions range between 16 to 25 per cent. This, coupled with the difficult procedures to access credits, adversely affects the growth of industries in Tanzania. The absence of development banks or other financial institutions that could provide long-term development credits at lower interest rates is another limitation on the efforts of manufacturing investors. This is due to the fact that the country's working capital structure is skewed towards debt, a reflection of the stock market's infant status and that most firms are still unlisted. Some of the firms operating with excess capacity have blamed insufficient working capital, among other factors, for their inefficiency.

High transport cost and other inputs

Textile industries are also affected by high cost of transporting raw materials and other inputs cited the high costs of raw materials. High costs are generated by long distances between location and material sources; rising energy costs; and inflation, particularly during the recent past years. High production costs generally translate into higher prices for the final product. and compromised competitiveness on the world market. Also the price of cotton in recent years has shown an unusually high degree of volatility, rising steeply from June 2010 when the price was 88 US cents a pound to peak at around 235 US cents/lb by March 2011, and then falling steeply to 106 UScents/lb by early October 2011 and to 87.2 UScents/lb today. This volatility has affected the farmers and decreased the production of cotton.

To address this challenge, policy options, including stabilization of prices, construction and rehabilitation of key infrastructures to reduce transport cost and firms investment in efficient technology are required.

Depreciation of nominal exchange rate

Manufacturers pointed to the exchange rate depreciation as a challenge

to their operations. As was noted earlier, manufacturing inputs are largely imported depreciations and currency simply manifest as increased prices for imports and decreased prices for exports. In theory, this means increased competitiveness and more exports. However, as Tanzania is a net importer of both inputs and final products, the question is whether the country can become exchange rate competitive since depreciation is tantamount to giving discount in the market for commodities in short supply. As the country manufactures a reasonable quantity of tradable goods, depreciation cannot be fruitful in terms of an improvement in external balance and subsequent growth. The solution to this dilemma is within the jurisdiction of the Central Bank which needs to find the right balance by critically examining the country's export-import configuration and the implications of exchange rate dynamics.

High energy cost

The high cost of energy is causing manufacturers to turn to expensive power sources to lessen the effects of electricity cuts and unstable supplies. Power backup systems and the use of fuel generators are dearly expensive. The suggestion is that the government should continue to invest in the energy infrastructure to secure the generation of reliable and affordable energy. Incentives to private investors to engage in energy production are necessary. Potential investors have expressed concerns about being able to sell energy at the market rate, and the type of government contract needed for the distribution of electricity through TANESCO.

A clear arrangement indicating that the private sector could benefit from the production of electricity, like any other commodity, could attract investments in energy.

Market challenges

A major market challenge of the manufacturers is the competition from products produced outside the country, following trade liberalization as explained earlier now there is inflow of cheap clothes from other countries.

The other challenge mentioned was the distance from the markets. Due to poor transport infrastructure, some parts of the market are inaccessible and transportation costs too high. Large sections of the domestic markets are unexploited owing to their difficult-to-reach locations. This challenge revolves around the need for infrastructure development. The problem of income growth has a bearing on the sales of the manufacturing enterprises

Policy challenges

Manufacturing companies have policy impediments that include tax laws and local government by laws, these affect the development of textile industries

Nuisance taxes

Another challenge facing textile firms is presence of numerous taxes paid to both the central and local governments. Manufacturers felt that tax payment should be consolidated in a singular context to enable a firm pay all its dues once and at a specified place. The multiplicity of taxes is a disincentive to taxpayers, numerous taxes and fees increase the related taxation processes as well as costs for the firms, and frustrate their operations. For instance, firms in Tanzania pay a 6 per cent levy on private company payroll for skills and development, 0.3 per cent of annual turnover as city service levy, 5 per cent crop levy charged on farm gate prices, just to mention a few. The point here is that cumulative levies increase the cost of doing business and reduce competitiveness in both domestic and external markets. It follows that consolidation of taxes to reduce

procedures and bureaucracy is important not only for the manufacturers but also for other entities in the country. Reforms to simplify the tax system are part and parcel of the measures to enhance manufacturing sector performance. Government reform efforts must focus on resolving the tax dilemma in order to create incentives for manufacturers to pay taxes. In addition, there were complaints that rates were too high. This contention needs clarification, as manufacturers felt disadvantaged in the comparison of taxes paid versus their return in terms of public services including infrastructure, energy and other amenities. This implies that the government is either charging disproportionate tax rates or that it has not been able to proportionately transfer the value of the collected taxes to the provision of the public goods and services that are vital to the manufacturers.

Weaknesses in the firm-specific policies

Some firms have unsound policies that are a hindrance to production processes. Human resources policies in a number of industries lack the elements that could motivate workers who do not perform to the best of their ability; they may shirk, or be tempted by rent-seeking activities. Restructuring is needed for a change in corporate culture to make firms more profitable and competitive. Improving total productivity, raising quality, upgrading marketing strategy and encouraging new forms of manufacturing systems are important internal goals, attainable at the firm level. These could be achieved through changes in production techniques, equipment, personnel, reorganization of management and financial structures. The success of these sector-specific strategies depends on the performance of other supportive policies.

CONCLUSION AND RECOMMENDATIONS

This paper tried to assess the development of textile sector in Tanzania before and after trade liberalization policy with great focus on the current challenges affecting the sector.

The researcher noted that the pace and level of industrialization in Tanzania has been low and constrained in many ways. of The introduction various macroeconomic policies such as import liberalization was of little help in the entire need of establishing a viable industrial base for sustainable manufacturing industry in the country, the second hand clothes and other imports are retarding the growth of local textile industry as used clothes are sold at cheaper price compared to other local clothes produced within the country.

Following the challenges above which influence the development of textile sector in Tanzania, the present paper suggests various ways which can be used to trigger the development of the sector, these are

i) Power generation should be expanded to build confidence in the reliabilitv of electricity supply to manufacturers. Gas and other reliable sources of energy, those not susceptible to weather changes like hydro-generation, have to be prioritized. Speeding up the implementation of the national Power Systems Master Plan is of utmost importance for the growth and development of the manufacturing sector.

ii) Enhanced investment in science and technology should be given greater weight to

Stimulate industrial development. On this front, allocation of more funds to postgraduate education on specialized manufacturing programmes such as textile and applied research are a prerequisite. This will promote knowledge and skills development as well as a wider application of ICT.

iii) To foster competition in the market, targeted action to control the import of cheap counterfeits should be put in place and enforced across all types of imported goods.

iv) Further modification to tax reform is recommended. Tax rates have to be reviewed and synchronized to reduce multiple procedures, to lower compliance costs, and to eliminate all nuisance taxes.

v) Measures need to be taken to promote the consumption of domestic goods so as to build a tradition of consuming Tanzanian-made products and thus expand the market for local articles.

vi) Financial reforms have to be continued. Attention needs to be directed on lowering financial risks in the market to help reduce interest rates. This is pertinent to decreasing the cost of capital.

vii) Develop Competitive Quality Yarn Production

Extensive effort should be applied to improving yarn quality and efficiency. Contract farming should address quality and contamination problems as the lint enters production the process. Industrialists need professional guidance to upgrade their production control policies and systems and build the capacity and skills of technicians to produce better quality product. If this is achieved then the yarn could be an attractor for knit fabric producers to manufacture for the garment industry both in Tanzania and in the burgeoning garment industry of Kenya

viii) Monetary policy, and in particular exchange rate management, have to be implemented for greater price stability. This is necessary for controlling the costs of machinery/equipment and intermediate inputs procurement.

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Appendix 1.Cotton production regions in Tanzania

Table 1: Cotton Production and Yield Trends: 2001/02-2008/09

Period	Acreage	Yield	Production	
	('000 Hectares	Kg/ Ha	('000 MT)	
2001/2002	392	161	63	
2002/2003	291	172	50	
2003/2004	459	257	117	
2004/2005	471	212	100	
2005/2006	450	214	96	
2006/2007	459	215	99	
2007/2008	410	163	67	
2008/2009	485	256	124	

Source: Tanzania Cotton Board; Cotton World Statistics in Bulletin of the International Cotton Advisory Committee; September, 2009.



Table 2: Performance of Traditional Exports from year 2012 – 2014 (millions of US dollar)

Source: Bank of Tanzania, Monthly Economic Review, Jan 2015.

Influence of Promoters, Directors, and Debt on Voluntary Disclosure Level

Rama Seth Indian Institute of Management Calcutta Kolkata, India 700104

Keywords –Insider Ownership, Corporate Governance, Cost of Capital, Voluntary Disclosures

INTRODUCTION

On June 4, 2010, the government announced measures to amend the securities regulations for Indian PLCs to ensure a minimum public shareholding of 25 percent by non-promoters. In this context, understanding the ramifications of voluntary disclosures by firms in India becomes important, for both Indian PLCs and their investors.

Chalapati Rao (2010) noted that only 227 Indian PLCs are actively traded on the Indian stock exchanges, which consists of 39 government companies, 29 159 Indian foreign companies, and companies. According to him if one assumes that in all these closely held companies promoters were required to offload their shares to comply with the regulation on dispersed shareholding, that value would be nearly Rs. 1.48 lakh crores. This dilution of ownership concentration from promoters to nonpromoters to meet the SEBI regulation is substantial; however, this attempt to raise capital from non-promoters is small compared to the total Indian market capitalization of around Rs. 60 lakh crores.

Beckett (2012) made the following statement in the WSJ "Mr. Cote zeroed in on a recent rule from the Securities and Exchange Board of India requiring any company listed on an Indian stock exchange to pare its majority shareholder's stake to a maximum of 75% by next June or buy out minority shareholders and delist the company. Honeywell owns 81% of Honeywell Automation India Ltd. Mr. Cote said the rule means Honeywell faces the dilemma of paying ridiculous price to buy out the remainder, or lose money reducing its stake (p. B3)."

The study is set in the context of a new concept of corporation: From CSR to Corporate Shared Value [CSV]. By creating CSV innovation and growth can be engendered and not just profit per se. Such a shift in perspective can reshape markets and society and its needs. Business and society need no longer be in conflict.

The remainder of the paper is organized as follows. Section 2 develops the hypotheses, section 3 details the study's methodology, and section 4 reports the findings. and section 5 concludes the paper.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Ownership structure

Studies have shown that, for strategic reasons firms may decide not to fully disclose information. In India, lack of wide dispersion of shareholding is a cause of both low disclosure and weak securities regulation. It is important to understand the

In Indian PLCs the promoters who are present on the board of directors and the senior managements' ownership fraction of the firm's equity shares are both large, and they exercise tremendous influence over the board of directors. Here the principal-principal agency conflict is likely to be the major agency issue.

Chalapati Rao (2010) observed that "notwithstanding the improved disclosures and insistence on a minimum proportion of independent directors on the board, in most companies promoters control majority equity and individual (nonpromoter) shareholders have been pushed to the margins" (p. 2). promoters' ownership levels barely gives them control because they would be concerned with revealing information that may force them to dilute their ownership interest. Thus, we state a directional hypothesis as:

H1: Ceteris paribus, the higher the promoters' shareholdings in Indian PLCs, the higher the voluntary disclosure levels.

India, studies have used In institutional theory to argue that due to the weaknesses in the external institutional environments and the overburdened legal system there is a need for high ownership concentration by families (Singh & Gaur, 2009). More importantly, studies have discussed the history and policy distortions that lead to institutional voids the establishment encouraging of business groups (Kedia et al., 2007; Majmudar, 2004). Briefly, these studies suggest that the Indian government forced firms to form business groups by imposing regulatory and bureaucratic hindrances on the growth of Indian PLCs. A few well referenced government policy instruments that have forced Indian firms to obtain regulatory approvals before they could start new operations or increase their production capacity were: Monopolies and Restrictive Trade Practices Act (1969),

Industrial Licensing Policy Inquiry Committee (1969), and Foreign Exchange Regulation Act (1973).

According to Khanna & Palepu (2000) and Singh & Gaur (2009), business groups provide several benefits for Indian PLCs to help them circumvent problems that arise due to inadequate institutional support, because group affiliation provides easier access to capital, materials, and markets for their products. Singh & Gaur (2009) empirically showed that business group affiliation is more beneficial to Indian family companies than to Chinese companies, which have "State" ownership. In addition, the overall size of the group provides for economies of scale and scope in terms of branding for affiliated companies, research and development, and human resources development. Hence, given these benefits, we believe that Indian PLCs that belong to business groups would voluntarily disclose more information about their operations, and hypothesize that:

H2: Ceteris paribus, the group affiliation of Indian PLCs results in greater voluntary disclosure levels.

The ceteris paribus conditions in our hypotheses relate to firm-specific characteristics that can influence the voluntary disclosure levels of companies. Agency theory and the institutional perspective argue that in large companies there is greater potential for conflicts between management and stakeholders such as the government (Watts and Zimmerman, 1986). Larger companies undertake activities that are more complex than smaller firms do, and tend to disclose more information voluntarily in order to reduce the threat of more regulations (Francis et al., 2005). Additionally, the larger the firm size, the greater the fraction of the capital that investors are required to own, hence, the more of the promoters' investments or "eggs in one basket" and the greater the risk (Fama & French,

1983). Hence, in order to reduce risk, managers of larger Indian PLCs such as Honeywell Automation India are motivated to disclose more information voluntarily to signal that they are acting in the best interest of all stakeholders. Hughes (1986) argued that investors are likely to believe that the signaled information is credible because signaling is costly and the costs of incorrect signaling often exceed the benefit. Particularly, studies have shown that firms that raise new capital on the exchanges voluntarily disclose more information (e.g., Sengupta, 1998; Eng. 2001). Hence, we control for whether the Indian PLCs raised new capital in 2007-2008 and for the firm size. Finally, the level of firms' leverage can influence the cost of debt and firms' beta measures systematic risk; thus, we control for them too.

METHODOLOGY

Sample selection

The sample consists of the largest 100 listed firms on the Bombay Stock Exchange (BSE) and the National Stock Exchange. The sample size reduces to 83 firms because of the unavailability of detailed data on promoters' ownership level as well as share price information for a continuous period of 15 months from January 2007 to March 2008 that is required to calculate the CAPM beta for each firm[3].

Measurements

Disclosure index

The voluntary disclosure index or DSI is calculated using the financial information provided by the listed firms in their 2007-2008 annual reports to shareholders. The methodologies of Botosan's (1997) and Eng et al. (2001) are used to calculate the DSI score for each firm. The five categories of voluntary information disclosures identified in prior studies are: 1) background information, 2) five-year summary of historical results, 3) key non-financial statistics, 4) projected

management 5) information. and discussion and analysis. However, the information provided by Indian firms is not as extensive as the information provided by US firms. For example, while Botosan's scoring instrument used a 10year summary of historical results, we could only obtain a maximum of 5 years of summarized historical results. Botosan's (1997) index rated the major disclosure elements shown in the appendix using a 10-point scale based on the qualitative and quantitative characteristics of the information. However, we chose to use only a 3-point scale with a score of 1 indicating minimal information about an element, a score of 3 indicating maximum (providing both qualitative and quantitative) information about an element, and a score of 2 for partial provision of quantitative information. These modifications to scoring are more similar to the Singaporean study by Eng et al. (2001). The appendix provides details of the kind of information provided in each section of the annual report, and as shown there are 35 items scored on a scale of 1-3 that could provide a maximum DSI score of 105 for a firm.

Cost of capital

We measure the cost of debt as total interest expenses divided by interestbearing debt. Following Eng et al. (2001), which found that returnonequity is the best proxy for cost of equity capital in Singapore, we also measured the cost of equity as the ROE. The ROE is calculated as net income divided by total equity, and total equity is calculated as total assets minus total liabilities.

Ownership structure

We obtained publicly available information on Indian PLCs from the Prowess database, which makes available the information provided by the listed companies on the National Stock Exchange and the Bombay stock exchange. Broadly, the ownership data

67

are divided into two groups – promoters' (Pro_Own) and non-promoters' ownership percentages(Non_Pro_Own).

Additionally, the promoters' ownership is divided into foreign versus Indian promoters, and non-promoters' ownership is divided into institutional investors versus the rest. Thus, in addition to first performing our analysis with the promoters' ownership levels, we also subdivide promoters' ownership into Indian promoters and non-promoters as institutional ownership and redid our analysis that is discussed in the discussion section[4].

Governance

Information on the number of independent directors on the board, role duality of the board chairman also being the company CEO, and the presence of audit committee an were publicly available. However, we found that fewer than five out of the 100 firms in our sample have role duality, and all the firms had an audit committee. Thus, because of the lack of variability in these two corporate governance variables, we decided that only board independence (Board Ind) would matter in terms of having a differential impact on the DSI score and the ROE of Indian PLCs. Whether or not an Indian PLC belongs to a group (Grp Aff) was modeled as "1" (ves) or "0" (no) depending on the annual report evidence.

Control Variables

Our models include two control variables – firm size (LnSize) and leverage (Lev) – which were used in past studies (e.g., Eng et al., 2001). We chose to use thenatural log of total assets to proxy for size, and total liabilities divided by total assets to proxy for leverage (Lev). In addition, we also controlled for whether a company raised new capital (N_Cap) in the 2007-2008 period using a dummy variable of "1" if it did or "0" otherwise. *Models*

Initially, hierarchical we use regression analysis to test the effect of ownership structure and governance variables on the voluntary disclosure index (DSI) as well as the incremental explanatory power of the cost of debt capital and its interaction with board independence. Subsequently, in the discussion section, we use two-stage regression analysis to test the predictive ability of the models, and use it to predict DSI as a function of ROE, promoters' ownership, board independence, cost of debt and its interaction with board independence. The models tested are as follows:

DSI [ROE] = $\alpha_0 + \alpha_1$ LnSize + α_2 ROE + α_3

Lev + α_4 N_Cap + α_5 Pro_Own + α_6 Pro_Own² + α_7 Grp_Aff + α_8 Pro_Board_Mgmt + α_9 Board_Ind + α_{10} Beta + ϵ_i ____ (1) or [3]

DSI [ROE] = β_0 + β_1 LnSize + β_2 ROE + β_3 Lev + β_4 N_Cap + β_5 Pro_Own + β_6

> Pro_Own² + β_7 Grp_Aff + β_8 Pro_Board_Mgmt + β_9 Board_Ind + β_{10} CoD + β_{11}

Board_Ind*CoD +

 $\begin{array}{cccc} & + \beta_{12} \text{ Beta} + \varepsilon_i & \underline{\qquad} (2) \text{ or } [4] \\ & \text{When promoters of Indian PLCs} \\ & \text{decide to sell shares, they are in effect} \\ & \text{deciding to alter the ownership structure of} \end{array}$

the firms, and a high probability that diffusion can lead to diluting the promoters' control in their firms. The connection between ownership structure and firm performance has been the subject of ongoing debate in the corporate finance literature, which goes back to Berle and Means' (1933) thesis. Berle and Means (1933) suggested an inverse relationship between the diffuseness of shareholding and firm performance because agency theory argues that greater equity ownership helps align the interest of shareholders and managers.

Demsetz (1983) challenged this view, arguing that the ownership structure of a corporation is an endogenous outcome that is influenced by the profit-maximizing interest of the existing and potential shareholders. Hence, they argued that there should be no systematic relation between variations in the ownership structure and variations in firm performance (Demsetz and Lehn, 1985; Demsetz and Villalonga, 2001). Morck et al. (1988) ignored the endogeneity issue and re-examined the relation between ownership structure and firm performance. They estimated a piecewise linear regression of Tobin's Q on insider ownership levels and found a positive coefficient for management holdings of shares between 0 percent and 5 percent of equity shares, a negative coefficient for management holdings between 5 percent and 25 percent, and again a positive coefficient once management holdings were greater than 25 percent. Therefore, in totality, the US studies do provide strong evidence that firm performance and managerial equity ownership are nonlinear (e.g., Demsetz and Villalonga2001, Himmelberg et al., 1999). Consequently, in our models we assume that the relationship between ROE and promoters' ownership level are a quadratic function, and control for systematic risk measured by the firm's beta. Model 1 tests for the non-linear relationship between ownership and other corporate governance variables and voluntary disclosure levels, and model 2 examines the incremental effect of the cost of debt and its interaction with board independence. Models 3 and 4 test for the effect of the same explanatory variables on influencing the firm's ROE.

RESULTS

Table 1 shows the descriptive statistics, which indicate that on average an Indian PLC's voluntary disclosure or DSI score is 68 out of a maximum possible score of 105 (65 percent). The

mean (median) ROE is 20.8 percent (17.7 percent), and the average (median) cost of debt is 13.7 percent (6.4 percent) while the mean (median) leverage ratio is 23.7 percent (19.6 percent). As indicated by the standard deviation and the range for these ratios, there is a wide variation in ROE and debt burden, but not as much variation in the DSI score or the average size of the firms. For Indian PLCs the average governance scores indicate that promoters have controlling ownership in their firms (i.e., around 50.5 percent) and on average board independence is 51 percent. Further, in 2007-2008, 63 percent of the firms raised new capital, and the mean (median) systematic risk or beta is 0.97 (0.95), which indicates that their returns move closely with the market returns.

Table 2 correlation statistics suggest that the DSI score is not correlated significantly with firms' ROE, promoters' ownership levels (Pro Own), board independence (Board Ind). or However, as expected, the larger Indian PLCs have a higher leverage ratio and lower ROE, are less likely to have a promoter both on the board and in management, and are not likely to be affiliated with a group. Additionally, a higher ROE is significantly negatively associated with leverage and board independence; hence, we believe that ROE is an appropriate proxy for cost of equity capital. Further, the leverage ratio is negative and significantly correlated with promoters' ownership levels and the cost of debt (CoD), but it is positive and significantly correlated with board independence and group affiliation. The promoters' ownership level is significantly negatively correlated with the firms' board independence, group affiliation, and the firms' beta, but it is positively associated with the CoD and capital intensity of assets. Hence, the univariate results confirm the importance of evaluating

2016

board independence as a moderating variable that influences the relation between CoD and DSI after controlling for the influence of the promoters. Finally, promoters being on the board and in the management of these firms are positive and significantly related to a company being part of a group and negatively related to the firm's beta. Thus, given that a firm's group affiliation encourages disclosures, we feel we were correct to hypothesize that creditors and the CoD and board independence are more likely to influence the DSI score than nonpromoters (e.g., institutional owners) are.

Hypothesis H1 states that the higher the promoters' shareholdings in Indian PLCs the higher the voluntary disclosure levels or DSI score. Table 3 provides the results for model 1, which show the effect of promoters' shareholding on DSI after controlling for firm size, leverage, raising new capital, and the group affiliation. Model 1 results suggest that the relationship between Indian PLCs' DSI score and promoters' shareholdings is non-linear, because the squared term of the promoters' ownership concentration is positive and the unsquared coefficient of promoters' ownership level is negative significant. This quadratic and relationship suggests that at very high levels of ownership concentration, the disclose promoters voluntarilv more information about their companies' mission and performance, which is not likely if they do not have a controlling ownership stake in the firm. Thus, we conclude that there is conditional support for H1, namely, beyond a certain threshold of promoters' shareholding (around 51 the Indian PLCs voluntarily percent) disclose more information. This between relationship ownership concentration and voluntary disclosure seems to be analogous to the association between ownership concentration and

performance that is documented in prior US studies (e.g., Mock et al., 1988).

Hypothesis H2 states that group affiliation of Indian PLCs results in greater voluntary disclosure levels. Table 3 results show that group affiliation coefficient is not significant. Hence, we conclude that there is no support for H2.

DISCUSSION

In this section, we compare our findings with studies by Singh & Guar (2009) and Eng et al. (2001). Sing &Guar (2009) found that board independence had a negative effect on performance, which they argue is because in India, board members play more of an advisory role than an oversight or monitoring role. They state: "the board acts to assist the firm management, rather than contain it. More insiders in the board are likely to be helpful in this respect (p. 419)." However, we find that board independence has a positive effect on increasing the Indian PLCs' voluntary disclosure levels. particularly when the cost of debt financing is high. In addition, to test the validity of Sing & Guar's (2009) results we performed a regression with ROE as the dependent variable and voluntary disclosure levels, board-independence, cost of debt, and its interaction with board independence as explanatory variables. Table 4 results find thatbeyond firm size and leverage, the only significant negative effect on ROE is promoters on the board and the management of the firm (i.e., the coefficient of variable Pro Board Mgmt). Our differing results compared to Singh & Guar (2009) may be due to the fact that they measured performance using return on assets and they did not include the variable Pro Board Mgmt in the model. We measured ROE, which is a better measure of the risk versus return tradeoff for equity shareholders, and hence a better proxy for cost of equity than firm performance. Inclusion of the Pro Board Mgmt variable probably

captures the promoters' influence on the board, which may be stronger than the influence of independent boards of directors in Indian PLCs[5].

In Singapore, Eng et al. (2001) suggested that, in a low mandatory disclosure environment, the presence of analysts following the firm adds credibility to the level of voluntary disclosure, which results in a lower cost of equity. Tables 3 and 4 show that, in Indian PLCs, the relationship between voluntary disclosure levels and ROE is conditional on the ownership while promoters' level, promoters play a significant role in the management and board monitoring the firm's ROE itself. Thus, it is possible because of the dominance of the promoters in Indian PLCs influencing the voluntary disclosure levels and the riskreturn trade-off to shareholders, that both DSI and ROE are jointly determined. Hence, the variables voluntary disclosures and ROE are endogenous. Consequently, in a follow-on paper we propose to use two-stage least square (2SLS) analysis to predict the DSI score with ROE as an instrumental variable as well as promoters' ownership level, board independence, CoD, and the interaction between board independence and CoD as predictor variables (i.e., model 4).

CONCLUSION

A *Wall Street Journal* article by Anand (2012) stated that "after years of complaining about poor treatment as minority investors in India's publicly traded companies, some Western hedge funds are turning to activist tactics. The moves may mark the beginning of a more confrontational period between foreign investors and Indian companies, which tend to be owned by either their founders or the government." The SEBI enacted a regulation in 2010 to increase minority shareholder participation in Indian PLCs, and it wants to ensure that at least 25 percent of the outstanding shares are in the hands of non-founders or nonpromoters. However, this is proving hard to accomplish, partly because of the promoters' influence on Indian PLCs is not transparent. Thus, our study focused on understanding what influences voluntary disclosure levels in Indian PLCs. We developed and tested five hypotheses related to promoters' ownership levels, promoters' influence. board independence, and the cost of debt as well as the interaction between board independence and the cost of debt on Indian PLCs' voluntary disclosure levels. The most robust finding is that voluntary disclosure levels are higher when promoters have a greater than controlling ownership interest in the firm and the cost of debt had a significant negative effect on voluntary disclosure levels. However, when the cost of debt is high, board independence played a critical role in improving voluntary disclosure levels. Additionally, non-promoters seemed to prefer investing in Indian companies that had boards that are more independent but with an affiliation to a group. These complex relations between promoters' ownership and influence, board independence, cost of debt, and group affiliation can be explained by institutional theory rather than agency theory because they highlight the Indian government's policy distortions, which have a history of making villains out of large profitable private growth companies.

Notes

- For example, Adani Enterprise Ltd., which is an Indian PLC, has three nonindependent family members on a board (Gautam Adani, Rajesh Adani, and Vassant Adani) that has eight members. Further, the first two members of this family are also senior company executives (CEO and CFO).
- 2. It was difficult to determine precisely whether the CEO was a member of a promoter family and a board member.

Hence, we first determined whether promoters were on the board and then assessed (using company websites and the databases) whether they were part of the senior management team.

- 3. The 2007-2008 fiscal year ends in either December 2007 or March 2008 for a majority of the Indian listed firms.
- 4. Another category is labeled as custodian ownership that is not a part of promoters or non-promoters. Although it's difficult to decipher who they are, these owners typically comprise less than 3 percent of the total. We also gathered information on the percentage of government ownership; however, it has no significant effect.
- 5. The return on assets (ROA) for the Indian PLCs is 12%, and it is significantly positively correlated (0.80) with ROE. Further, if ROA is the dependent variable, it is significant and positively correlated with the disclosure index and it has a marginally significant association with board independence.

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APPENDIX

Major elements of the disclosure index used in Botosan (1997) are listed below. We rescored the Indian firms using a scale from 0-3 to code the following items, where 0 refers to not available, 1 refers to minimal, 3 refers to maximum (both qualitative information supported by numbers) disclosure.

I. Background Information

- i. Statement of corporate objectives
- ii. Barriers to entry are discussed
- iii. Competitive environment
- iv. General description of the business
- v. Principal products sold
- vi. Principal markets served

II. Five-Year Summary of Historical Results

- i. Return on assets or sufficient information to compute return on assets (i.e., net income, tax rate, interest expense, and total assets)
- ii. Net profit margin or sufficient information to compute net profit margin (i.e., net income, tax rate, interest expense and sales)
- iii. Asset turnover or sufficient information to compute it (i.e., sales and total assets)
- iv. Return on equity or sufficient information to compute it (i.e., net income and stockholders' equity)
- v. Summary of sales and net income for recent 4-8 quarters.

III. Key Non-Financial Statistics

- i. Number of employees
- ii. Average compensation per employee
- iii. Order backlog
- iv. Percentage of sales in products designed in the last five years
- v. Market share
- vi. Units sold
- vii. Unit selling price
- viii. Growth in units sold

IV. Projected Information

- i. Forecasted market share
- ii. Cash flow forecast
- iii. Capital expenditure and/or R&D expenditure forecast
- iv. Profit forecast
- v. Sales forecast

V. Management Discussion and Analysis:

- i. Change in sales
- ii. Change in operating income
- iii. Change in cost of goods sold
- iv. Change in gross profit
- v. Change in selling and administrative expenses
- vi. Change in interest expenses or interest income
- vii. Change in net income

- viii. Change in inventory
- ix. Change in accounts receivable
- Х. Change in capital expenditure or R&D
- Change in market share xi.

Descriptive Statistics					
Variable	Mean	Std. Dev.	Minimum	Median	Maximum
DSI	67.80	3.13	54.00	68.00	76.00
LnSize	12.16	1.36	9.38	12.12	16.15
ROE	20.83%	17.72%	-2.99%	17.70%	113.96%
Lev	23.73%	21.63%	0.00	19.61%	87.11%
N_Cap	0.63	0.49	0.00	1.00	1.00
Pro_Own	50.54%	22.43%	0.00	52.26%	98.38%
Pro_Board_Mgmt	0.32	0.47	0.00	0.00	1.00
Board_Ind	51.46%	15.94%	2.00	52.00%	91.90%
Grp_Aff	0.74	0.44	0.00	1.00	1.00
CoD	13.71%	36.35%	0.00	6.39%	319.21%
Beta	0.97	0.66	-3.64	0.95	1.97
Ind_Own	0.86	0.34	0.00	1.00	1.00
Gov_Inf	0.21	0.41	0.00	0.00	1.00
PPE_TotAss	0.18	0.17	0.00	0.14	0.63

Table I

n=100 for all variables except for two variables. For the Pro Own variable, it is 94 and for Beta, it is 83.

Legend:

DSI = Voluntary disclosure index

LnSize = Log of total assets

ROE = Return on equity

Lev = Leverage

N Cap = Raised new capital in 2007-2008

Pro_Own = Promoters' ownership percentage

Pro Board Mgmt = Promoter is a member of the management and on the board of directors Board Ind = Percentage of independent directors on the board

Grp Aff = Group affiliation; if the firm belonged to a group of companies it is coded as "1", otherwise "0"

CoD = Cost of debt capital

Beta = Systematic risk measured by regressing a firm's return on a market index

Ind Own = Fraction of the firms where majority ownership is by Indian nationals

Gov_Inf = Government influence present; coded as "1", otherwise coded as "0"

PPE TotAss = Property plant equipment as a percentage of total assets

Rama Seth

79

Table II Correlation Statistics									
Variable	DSI	LnSize	ROE	Lev	Pro_ Own	Pro_Board_ Mgmt	Board_Ind	Grp_Aff	CoD
DSI	1								
LnSize	0.080	1							
ROE	0.124	-0.377***	1						
Lev	-0.109	0.138*	-0.233***	1					
Pro_Own	-0.011	-0.017	0.044	-0.170**	1				
Pro_Board_Mgmt	-0.023	-0.246**	-0.119	0.072	0.016	1			
Board_Ind	0.080	0.109	-0.128*	0.245***	-0.251***	0.120	1		
Grp_Aff	-0.106	-0.131*	-0.067	0.170**	-0.292***	0.309**	0.077	1	
CoD	0.020	-0.009	0.098	-0.214**	0.173**	0.058	-0.034	-0.122	1
Beta	0.092	0.042	-0.004	-0.084	-0.214***	-0.223**	0.003	-0.008	- 0.045

Legend: Described in Table I

* Significant at p < 0.10 level when coefficients are greater than 0.158

** Significant at p < 0.05 level when coefficients are greater than 0.191

*** Significant at p < 0.01 level when coefficients are greater than 0.251

Table III

OLS Regression of Voluntary Disclosure Index (DSI) on Promoters Ownership, Promoters in Management Board Independence and Cost of Debt

	Model 1	Model 2
Intercept	69.117***	69.185***
	(17.486)	(21.409)
LnSize	0.041	0.117
	(0.153)	(0.433)
ROE	0.028	0.030
	(1.326)	(1.438)
Lev	015	-0.010
	(-0.913)	(-0.642)
N_Cap	-0.204	-0.326
	(-0.298)	(-0.475)
Pro_Own	-0.121**	-0.122**
	(-2.432)	(-2.467)
Pro_Own ²	0.001***	0.001**
	(2.490)	(2.445)
Pro_Board_Mgmt	0.111	0.060
	(0.148)	(0.079)
Board_Ind	0.008	-0.007
	(0.365)	(-0.286)
Grp_Aff	0.103	-0.137
	(0.126)	(-0.166)
CoD		-5.979*
		(-1.831)
Board_Ind x CoD		0.123*
		(1.830)
Ν	93	93
R Square	0.109	0.145
F. Stat. Sig.	0.340	0.103

* Significant at p < 0.10 level

** Significant at p < 0.05 level

*** Significant at p < 0.01 level

Legend:

LnSize = Log of total assets

ROE = Returnonequity

Lev = Leverage

N_Cap = Raised new capital in 2007-2008

Board_Ind = Percentage of independent directors on the board

Pro_Own = Promoters' ownership percentage

Pro_Own² = Square of the promoters' ownership percentage

Pro_Board = Promoter on the board of directors; coded as "1", otherwise "0"

Grp_Aff = If the company belongs to a group of companies, coded as "1", otherwise "0" CoD = Cost of debt capital

Board-Ind x CoD = Interaction term between board independence on cost of debt

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Quadcopter UAV Based Fertilizer And Pesticide Spraying System

S.Meivel M.E, Jay Shriram Group of Institutions, Tirupur, India meivel.embsys@gmail.com Dr.R.Maguteeswaran Jay Shriram Group of Institutions, Tirupur, India principal@jayshriram.edu.in N.Gandhiraj B.E Jay Shriram Group of Institutions, Tirupur, India gandhi.covai@gmail.com G.Srinivasan Kamaraj College of Engineering & Technology, Virudhunagar, India. ssarvinth1992@gmail.com

ABSTRACT

Indian agriculture needed production and protection materials to achieve high productivity. Agriculture fertilizer and chemical frequently needed to kill insects and growth of crops. The WHO (World Health Organization) estimates there are more than 1 million pesticide cases in every year. In that more than one lakh deaths in each year, especially in developing countries due to the pesticides sprayed by human being. The pesticide affects the nervous system of humans and also leads to disorders in body. A remote controlled UAV (Unmanned Aerial Vehicle) is used to spray the Pesticide as well as fertilizer to avoid the humans from pesticide poison. The UAV is operated by manual flight plans and the Sprayer is manually triggered by RF controlled Nozzle. The vertical take-off and landing quadcopter is used to spray the low volume pesticide in a small area. This project describes the development of quadcopter UAV and the sprayer module. And also discusses the integration of sprayer module to quadcopter system. This model is used to spray the pesticide content to the areas that can't easily accessible by humans. The Universal Sprayer system is used to spray the liquid as well as solid contents which are done by the universal nozzle.Multispectral camera is used to capture the remote sensing images which are used to identify the green fields as well as the edges of crop area. Total payload liftoff weight of quadcopter is 8 kg. Remote sensing images are analyzed by QGIS software.

Keywords: Unmanned Aerial Vehicle (UAV), Radio frequency (RF), Sprayer module, Remote sensing, GPS, Micro strip patch antenna.

The quadcopter is cost effective alternate to high cost standard rotorcrafts. UAVs are rapidly upcoming method for cultivation. production and protection processes. The quadcopter was chosen for this project because of high stability and more lifting power. The control of quadcopter is easier than the helicopter model of vehicles. Some applications of quadcopter are Search and Rescue, Police, Code Enforcement/Inspections, Emergency Management, Fire. Surveillance, Border Security, Defense, etc.

The WHO (World Health Organization) estimates there are more than 1 million pesticide cases in every year. In that more than one lakh deaths in each year, especially in developing countries due to the pesticides sprayed by human being and handling of pesticides. The health effects of pesticides include asthma, allergies and hypersensitivity, and pesticide exposure to cancer, hormone disruption and problems with reproduction and fetal development. Other pesticides may be irritated the skin and eyes. More pesticides are very dangerous carcinogens. Other pesticides may be

affects the hormone and endocrine system of the body. Even though very low levels of exposure during spraying may have leads to health effects. Pesticide exposure can cause a wide range of neurological health effects in body such as memory loss, loss of coordination, reduced speed of response to stimuli, reduced visual ability, altered or uncontrollable mood and general behavior, and reduced motor skills.

SOLUTION

UAV inbuilt pesticide sprayer is basically Sprayer integrated into a quad copter to spray pesticides and fertilizers in open crop fields. The main objective of this project is to reduce the ill-effects to humans. The quadcopter is used to spray the contents under any climatic conditions. The UAV inbuilt sprayer contains a universal sprayer which is used to spray the both Fertilizer and Pesticide on a same sprayer. The Universal nozzle is used to regulate the Liquid content as well as solid contents. The pressure pump is used on a Pesticide spraying and not on Fertilizer Spraying. Multispectral camera is used to capture the remote sensing images which are used to identify the green fields as well as the edges of crop area. GPS navigation is used here for auto guidance system for UAV.

REMOTE SENSE IMAGING

The remote sensing in agriculture is easy on now a day, because of new introduced technologies. Quadcopter and other drones are the best choice of mapping the remote sensing data. These are the low cost drones used in precision agricultural usages. Piloted aircrafts are more expensive method to map the remote sensing. Satellite data also costly method in agricultural remote sensing and also the real time remote sensing data is not possible with satellite. So, the Unmanned Aerial Vehicles are the best choice to map the remote sensing images. The information collected from these UAVs is good resolutions measured with inches per

pixel. This remote sensing data is used to map the growth of crops, moisture level and more.

MULTISPECTRAL CAMERA

Multispectral camera used to capture the remote sensing images. This multispectral camera is attached with small unmanned aerial vehicles and manned aircrafts also. RedEdge multispectral camera provides an accurate multi-band data for agricultural remote sensing applications. This camera can take the images on following five band are Blue, Green, Red, Red Edge, Near-Infrared. Captured images are stored in single SD card or in cloud storage and same way the captured image is transmitted to ground station via Wi-Fi. The multispectral camera is used to capture the five distinct bands are Blue (440 - 510 nm), Green (520 -590) nm, Red (630 - 685 nm), Red Edge (690 - 730 nm), Near-Infrared (760 - 850 nm).

After landing of the UAV, these images are taken into analyzing. The data from the multispectral camera is analyzed by the remote sensing or GIS software. Then the image is converted to Vegetation Index map. This data is used for farm management. This multispectral camera is coupled with any platform. Inbuilt GPS module maintains the GPS locations and time-stamping of captured images. So, we can easily identify the location of the green field. Then identification of the area going to spray will be easy. The GPS coordinates of the spray locations is stored in UAV for auto navigation. So, manual control is not needed to control the unmanned aerial vehicle.

NORMALIZED DIFFERENCE VEGETATION INDEX

Normalized Difference Vegetation Index (NDVI) is a geographical indicator which is used to analyze the remote sensing images.NDVI calculation gives a value -1 to +1; no green leaves give a value close to 0. A zero (0) means no S.Meivel, Dr.R.Maguteeswaran, N.Gandhirai, G.Srinivasan

83

vegetation and close to +1 (0.8 to 0.9) indicates the highest possible density of green leaves.

Design of Micro-Strip Patch Antenna

Rectangular Micro-strip Patch Antenna Incorporated with Innovative Meta-material Structure for Dual band operation and Amelioration in Patch Antenna Parameters with Negative µ and ε are designed and tested in RF Transmitter. **Quadcopter Working Principle**

The quadcopter is simple design with four rotor propellers with controller. The flight controller is the main part of this vehicle. This ardupilot controls all the operation commanded by us. The four rotors to create differential thrust and the quadcopter hover and move accordance with the speed of those rotors. There are two types of configuration in quadcopter construction. First one is Plus (+) configuration and another one is Cross (X) configuration. In this project we used X (Cross) configuration. Both the models are same, but the control of these models slightly different. The cross configuration is easier than plus configuration model. Total mass to lift is 4kg means, the total thrust produced by rotors should be 8 kg. GPS guidance system is used here to navigate the UAV. Pre-loaded trajectory gives the real time coordinates to ardupilot controller. Based on this GPS coordinates, the microcontroller navigates the UAV.

Sprayer Module

Sprayer module has two sections, they are 1) Transmitter section (Remote controller), 2) Sprayer with controller.Transmitter section used to control the actuator of sprayer module. The nozzle of sprayer module will be activated by remote control. Wherever need to activate the sprayer, just comment by remote RF transmitter. Sprayer module contains two sections, spraying module and controller. Spraying module contains the spraying content i.e., pesticide or fertilizer and the controller section used to

The activate the nozzle of spraver. from command is received remote controller which is activated manually. Tank contains the chemical content which is going to spray on crops that may be a pesticide or fertilizer. The Nozzle of the sprayer module will be activated by GPS device. This GPS module having the preloaded GPS coordinated.

Liquid Pump Motor with Tank

The spraving pump overflow rate is max, 1L/minutes. The maximum spraying height is 4 meters. Flying speed is max. of 5m/s. It covers 2m range of green fields with compatible land edge.

CONCLUSION & DISCUSSIONS

This method can be used in all situations, especially in the places where labours are hard to find. It has many advantages that include hastening the spraying process of pesticide thereby reducing the causalities due to pesticide exposures and hence prevents the encounters with the poisonous snakes like viper and cobra which are regularly found in our agricultural fields. Environmental pollution can be reduced when it sprayed from lower altitude. This research has shown that a spray system was developed successfully, which is suitable for an UAV application platform. The pest management and vector control can be achieved by the integration of the spray system with the UAV results in an autonomous spray system. It has a great potential to enhance pest management for small as well as the large crop field to entail highly accurate site-specification application. It is also a good method for the vector control in the areas where there is lack of easily accessible by persons or equipment.

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Figure 1. Edge detection of green field using multispectral camera and setting the trajectory of quadcopter.



Figure 2. Block diagram of quadcopter, Sprayer Module. This figure shows the blocks incorporated in the design of quadcopter and sprayer module. The sprayer module is integrated into the quadcopter.

Incentives when environment and unobservable managerial effort complement

Krishnamurthy Surysekar School of Accounting Florida International University Miami, FL 33199 April 23, 2015

ABSTRACT

This paper presents a simple model showing the incentive payments to a manager when his efforts are unobservable and the efforts and the environment act in a complementary fashion. Using the example of manufacturing quality, we show that 1) incentive payments increase with increase in cost of quality and 2) managerial effort at quality increases with incentive payments.

INTRODUCTION

Performance measurement and incentive payments must meet an important test of credibility - you get what you pay for. As Kerr (1995, p. 9) notes, the disproportionate impact of the university faculty reward systems on research versus teaching has made it "rational for university professors to concentrate their efforts on research even to the detriment of teaching, and at the expense of their students". Hemmer (1996) studies the effect of adding non-financial measures of performance to financial, accounting-based measures in determining managerial compensation.

The motivation for the present paper is to present a simple model using agency theory when managerial actions are unknown and cannot be contracted upon. However the environment can act in a way to negate all positive actions by managers. Adverse environmental conditions cannot be mitigated by managerial actions, and vice versa. In other words, both managerial actions and environmental factors act as complements and not substitutes.

The analytical work linking incentives and desired actions, using an

information economics framework has largely extended Holmstrom (1979). Holmstrom (1979)characterized an economically optimal rule that linked incentives to promote desired actions, and the informativeness of signals about those actions, for a given structure of the utility functions of the employer and the employee. Building on this work, papers by Banker and Datar (1989) and Feltham and Xie (1994) studied relative weights placed in the employee's reward mechanism on multiple signals about the desired actions and the relative precision of these signals.

Ittner, Larcker and Rajan (1997), points toward the increasing use of nonfinancial measures of performance like quality and customer satisfaction in managerial bonus contracts. Thus, incentives continue to be used to promote desired actions.

However, there has not been much analytical work on the relationship between incentive mechanisms and managerial actions, when they are complementary to environmental conditions. We aim to study the effectiveness of an incentive mechanism with a simple structure that might be employed in a firm desiring to promote efforts towards quality performance.

We recognize that TQM is a very broad concept that may encompass a number of initiatives like internal defect reduction, quick response, investments in Just-in-Time inventory systems, supply chain management, use of customer satisfaction indices in employee performance evaluation, organizational restructuring, etc. For tractability, we focus on internal defect reduction as the indicator of internal quality.

THE CONTEXT

In our context, a risk-neutral principal hires a risk-neutral agent to manage a production technology, and deliver an exogenously specified target level of good finished output. Holmstrom (1979) shows that, it is optimal to sell the firm to a risk-neutral agent, in the presence of moral hazard. However, we assume that the restricted wealth agent prevents this possibility.

Further, Kaplan and Atkinson (1998, p.683) note that nearly 80 % of the compensation of CEOs is based on risky measures of performance.

In our model, output is a function of the product of the agent's effort as well as a random state of nature. The level of the agent's effort is unobservable by the principal, and constitutes the moral hazard. This effort is personally costly to the agent. The state of nature is unobservable by both the principal and the agent, thus providing the agent with no superior private information other than his effort at getting output. Following Banker and Datar (1989), the payment to the agent is assumed to be a linear function of output.

In our model, the principal's objective is to select the parameters of the agent's payment that minimizes total cost, which is the sum of the cost of inputs, cost of reworking the initial defective output, and the agent's compensation. The agent is a utility-maximizing, effort-averse

individual, with a guaranteed minimum expected utility. In this case, we show that 1) incentive payments increase with increase in cost of quality and 2) managerial effort at quality increases with incentive payments.

THE OPTIMIZATION PROBLEM The Production Function Assume there is an owner

(principal) and a manager (Agent). The production target is T. Actual initial good production quantity, P, is the product of three factors: the target T, the agent's effort towards quality, $e \in [0,1]$, and a random state of nature, $s \in [0,1]$. This is given by (1) below.

P=T• e• s (1)

Note that the initial good production is zero if either the agent's quality effort or the state of nature is zero. This is the unique feature of this model. No matter how high the quality-related effort is, it can be completely undone by an environment that is not "quality-friendly". Similarly, no matter how "quality-friendly" the environment is, the initially good production is zero if the manager shirks from providing any effort towards quality. As an example, think of a company producing energyefficient appliances when energy prices are low. No matter how good the appliances are, the low energy prices provide a huge disincentive to production. Similarly, a company's energy efficient devices can fail due to lack of attention to quality even if there is huge demand for such devices. It is natural to assume such environmental uncertainties as random, whose realization is observed by neither the principal nor the agent.

Thus, it is clear that the initial good output equals the target final good output if and only if quality effort and the realized state of nature are each at their maximum levels. For example, if T=100, e = 0.9 and s=0.8, then P = 100(0.9) (0.8) =72. Thus, initial good output = 72, and the defective

output = 100-72 = 28. We assume that these 28 units are re-worked, at additional cost, to finally produce the targeted level of good output.

In terms of time, the principal and agent agree on the agent's contract, then the agent provides the level of effort the principal cannot observe, the environmental variable is realized next, leading to the initial good output. Finally any initial defects are re-worked at additional cost, Finally, the agent is paid per contract terms.

COST OF REWORK

Any difference between the target final good output and initial good output, will have to be reworked. Following Nandakumar, Datar and Akella (1993), we assume that rework costs are quadratic in the level of defects produced. This is set out in (2) below, where R is the cost of rework, and m>0 is an exogenously specified parameter.

$$\mathbf{R} = \mathbf{m}(\mathbf{T} - \mathbf{P})^2 \tag{2}$$

Combining (1) and (2),

$$\mathbf{R} = \mathbf{m} [\mathbf{T} - (\mathbf{T} \bullet \boldsymbol{e} \bullet \boldsymbol{s})]^2$$
(3)

AGENT'S COMPENSATION

The agent is paid a fixed compensation F plus a bonus based on initial good output. The bonus is given by C in (4) below

$$\mathbf{C} = (\mathbf{b} \bullet P) \tag{4}$$

Substituting (1) in (4) obtains

$$\mathbf{C} = (\mathbf{b} \bullet \mathbf{T} \bullet \boldsymbol{e} \bullet \boldsymbol{s}) \tag{5}$$

The bonus factor, b is restricted to be positive. This compensation structure captures the typical cash salary and bonus components of managerial compensation, with the additional feature that bonus is determined by progress in achieving low defectives. Our modeling of a linear payment scheme follows earlier approaches by Banker and Datar (1989) and Feltham and Xie (1994).

TOTAL MANUFACTURING COSTS

Total manufacturing costs are given by the sum of the cost of inputs, rework costs, and the agent's compensation. Without loss of generality, the unit cost of inputs is assumed to be 1. MC in (6) below represents total manufacturing costs.

 $MC = \{T\} + \{m[T - (T \bullet e \bullet s)]^2\} + \{F + (b \bullet T \bullet e \bullet s)\} 6\}$

The first {} in (6) is the cost of inputs, the second the cost of rework, and the third the agent's compensation with the fixed and the bonus components.

DECISION PROBLEM

The decision problem is now set up as an agency problem where the riskneutral principal minimizes the expected value of (6) subject to the traditional reservation constraint and an incentive constraint. The reservation constraint is that the agent, while maximizing his utility from this employment gets at least what he can get elsewhere. The agent is also assumed to be risk-neutral, deriving positive utility from monetary compensation, and a disutility from effort, represented by $\psi(e)$. Thus, the agent's utility, denoted by A, is given by (7) below.

 $A = F + (b \bullet I \bullet e \bullet s) - \psi (e)$ (7)

The usual assumptions on ψ (e) apply. Thus, ψ (e) is increasing and convex in e; $\psi(0) = 0$ and $\psi'(0) = 0$. Moral hazard is represented by the agent's quality effort, e,

not being observable by the principal. There is no adverse selection in this model. Neither the principal nor the agent can observe the realization of the state of nature s, but have a prior distribution of s. Ex-post, all parties can perfectly observe the initial good output.

The problem is now represented by Program OP. The principal minimizes expected manufacturing cost. The agent receives at least a guaranteed (reservation) level of expected utility, set at His expected utility. All expectations taken with respect to s, the state of nature. The choice variables, therefore, are e, F, and b.

PROGRAM OP

Obj: Minimize

 $E_{s} \{T + m[T - (T \bullet e \bullet s)]^{2} + F + (b \bullet T \bullet e \bullet s)$

subject to

 $E_{s}{F + (b \bullet T \bullet e \bullet s) - \psi(e)} \ge H$, (Reservation Constraint)

and

 $e \text{ maximizes } \{E_s \ \{F + (b \bullet T \bullet e \bullet s) \cdot \psi \ (e)\} \qquad (\text{Incentive Constraint})$

The (Second-Best) Solution

If effort by the manager were observable, the contract could be written on the level of effort he needs to provide. Since the effort is by assumption unobservable, the contact could only be based on observable elements – in our case, the initial good output. Thus we only have a second-best solution.

Simple algebra yields the following first-order conditions.

$$\mathbf{b} \bullet \mathbf{T} \bullet \mathbf{E}[\mathbf{s}] = \boldsymbol{\psi}'(\mathbf{e}) \tag{8}$$

 $F = E_s \{H + \psi(e) - (b \bullet T \bullet e \bullet s)\}$ (9)

Recognizing that effort is a function of b, we minimize (10) below, and obtain (11) below as the first-order condition for b.

$$E_{s}{T+m[T-(T \bullet e(b) \bullet s)]^{2} + \psi (e(b))}$$
 (10)

$$E_{s} \{T - 2m[T - (T \bullet e(b) \bullet s)] \frac{\partial e(b)}{\partial b} + (\psi'(e(b)) \frac{\partial e(b)}{\partial b})\} = 0 \qquad (11)$$

The first order condition for effort given in (8) above leads to the following lemma.

Lemma

The optimal (second-best) effort is increasing in the (optimal) bonus.

Proof

From (8), and the Implicit Function
Theorem,
$$\frac{\partial e(b)}{\partial b} = E \left[\frac{T \cdot s}{\psi''(e)}\right] > 0$$
 (Q.E.D.)

Using the above condition, we show in the next proposition that the optimal level of the bonus factor increases when the quality cost parameter increases, thus leading to higher quality effort.

Proposition 1

The bonus factor in the optimal linear contract increases with an increase in the quality cost parameter.

Proof

Applying the Implicit Function Theorem on (11), and using Lemma 1, we obtain

$$\frac{\partial \mathbf{b}}{\partial \mathbf{m}} = \frac{2\mathbf{E}_{\mathbf{s}}\{\mathbf{T} - (\mathbf{T} \bullet \mathbf{e}(\mathbf{b}) \bullet \mathbf{s})\}}{\mathbf{SOC}\{\mathbf{b}\}}$$

where SOC{b} denotes the second-order condition for b. The numerator of the right hand side is positive since $1 \ge e(b)$ and $1 \ge s$; For interior optimal b, the denominator of the right hand side is also positive. \therefore b increases in m. (Q.E.D).

As an illustration, consider the special case when s is assumed to be uniformly distributed in [0,1], and $\psi(e) = \frac{e^2}{2}$. Solution to the second-best

problem in this case leads to the following: $b \bullet T$

e

$$=\frac{1}{2}$$
 (12)

$$b = \frac{6m T}{3 + 2mT^2}$$
(13)

$$F = H - \frac{I^2 b^2}{8}$$
(14)

CONCLUSION

In reviewing the second-best solution, it is apparent that the bonus factor in the agent's compensation has the desired effect - motivate the agent to put in quality effort. The bonus factor increases in response to an increase in the quality cost parameter, thereby establishing a direct link between improved qualityrelated effort and rework costs. This relationship holds even in the context of the environmental factors and managerial effort acting in a complementary manner, i.e. one cannot substitute for the other.

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Analysis and Comparison of Ultrasonic Insertion Process Using Brass and Stainless Steel Horns

Kamalaesh UK

Department of Production Engineering PSG College of Technology, Coimbatore 641004 India <u>kamalaeshuk1@gmail.com</u> Dr. Elangovan S Department of Production Engineering PSG College of Technology, Coimbatore 641004 India

Abstract

Demand for plastics increases which increases the requirements for joining of thermoplastics with the metal inserts. These metal inserts are made of Brass in form straight and helical gear profiles. Ultrasonic welding is one of the most preferred processes. Thermoplastics are joined with metal inserts through ultrasonic insertion process. Acrylonitrile Butadiene Styrene (ABS) a thermoplastic material is chosen for the work. As heating is confined to the interface area, quality of weld mainly depends on temperature at the interface. So temperature distribution during welding is studied to predict the quality of weld between the metal and the plastic. Visco-elastic heating is most critical to ultrasonic welding of thermoplastics because it is the main mechanism by which heat is developed at the interface. Heat developed due to visco-elastic heating depends on applied frequency, amplitude, design and material of horn which we use. For the experimental purpose we use three parameters like inserting time, holding time, pressure to perform ultrasonic insertion process. We performed modal and harmonic analysis for brass and stainless steel horns and we experimentally performed ultrasonic insertion process. We analyzed the influence of two horn materials in forming an effective joint between the thermoplastic and brass insert then we analyzed the thermal images of inserted parts to study the thermal distribution and we also performed tensile testing to determine the ultimate tensile load and breaking load of the inserted part. Keywords: Thermoplastic (ABS); Metal inserts (Brass); Ultrasonic insertion.

INTRODUCTION

One of the most important process in manufacturing is joining of materials together. Among different joining processes welding provides a permanent joint and is most widely used for its strength, reliability and versatile nature. Welding metals is possible and more commonly done. In recent days requirements for joining metals and plastics are highly demanded. Especially inserting of thermoplastic and metal inserts through welding are highly advantageous over conventional method of mechanical fastening.

As per AWS, welding is, "A materials joining process which produces coalescence of materials by heating them to suitable temperatures with or without the

application of pressure or by the application of pressure alone with or without filler materials"

Ultrasonic welding is a solid-state welding process which uses high frequency sound waves in range of 20 to 20,000 Hz. high frequency sound waves This (vibrations) generates heat energy due to friction which is used to join materials. Recent advancement in the field of ultrasonic is "ultrasonic insertion". Ultrasonic vibration energy at the interface of parts being joined causes the plastic material to soften and flow for a fraction of second, when the metal is pressed together and re-solidified where a bond is formed. It is the process of embedding or encapsulating a metal component in a plastic part. This process replaces the

costly, time consuming, conventional method of mechanical fastening of thermoplastic with metal component. The thermoplastic part to be assembled is placed together with the brass insert, metal on top of the plastic part, in a supportive nest called a fixture. A horn is brought into contact with the upper metal insert. A controlled pressure is applied to the parts using horn against the fixture.

The horn vibrates vertically 20,000 (20 kHz) or 40,000 (40 kHz) times per second. at distances measured in thousandths of an inch (microns), for a predetermined amount of time called weld time. This vibratory mechanical energy is directed to limited points of contact between the two parts. The mechanical vibrations are transmitted through the thermoplastic materials to the joint interface to create frictional heat. When the temperature at the joint interface reaches the melting point, plastic melts and flows, and the vibration is stopped. This allows the melted plastic to begin cooling. The clamping force is maintained for a predetermined amount of time to allow the parts to fuse as the melted plastic cools and solidifies. This is known as hold time. Once the melted plastic has solidified, the clamping force is removed and the horn is retracted. The plastic part is now joined with the metal insert and then it is removed from the fixture as one part.

A. Ultrasonic inserting process

Ultrasonic Insertion is the assembly process of embedding a metal component in a thermoplastic part. A hole is premolded into the thermoplastic part slightly smaller than the O.D. of the insert it is to receive. As ultrasonic energy is applied to the insert, frictional heat is generated due to the insert vibrating against the plastic. The plastic melts, permitting the insert to be driven into place. The insert is surrounded by molten plastic, which flows around the knurls, flutes, and undercuts on the O.D. of the insert.

B. Ultrasonic inserting methods

1. The horn can touch the insert, driving it into the plastic part.

2. The horn can touch the plastic part, driving it over the insert.

C. Process parameter guidelines.

The following basic guidelines for ultrasonic insertion should be taken into consideration when developing an ultrasonic insertion process:

- Low to medium amplitude the total gain of the horn/booster combination should be between 1.5 to 2.5.
- Low to medium pressure 100 to 280 kPa with pressure increased accordingly for large or multiple inserts.
- Pre trigger should be active.
- Slow down speed of the carriage assembly, to allow melting to occur and to prevent cold pressing the insert in place.
- Rigid fixing providing ample support during welding.
- After seating, the top of the insert should be flush or slightly above the surface of the part for maximum pullout strength and torque resistance.

D. Plastics

Plastics are based on polymers and they are created by bonding monomers together.A monomer is a small molecule that combines chemically to other monomers to form a polymer.

Example: An ethylene monomer forms a long chain monomer due to individual ethylene monomers joined together. This produces the polymer polyehtylene.

E. Advantages of ultrasonic inserting process

Ultrasonic insertion offers several advantages over the other insert assembly techniques including

92
- Short cycle time-typically less than one second.
- Reduced molding cycle times.
- Multiple inserts can be driven at one time.
- Ideal for automated, high production operations.
- Repeatability, consistency, and control over the process.
- More consistent results as compared with direct thermal processes.

F. Applications

- Instrument panels
- Door panels
- Electronic panels
- Steering wheels
- Engine components
- Door handles and house hold devices

LITERATURE REVIEW

More than 20 national and international journals from 1994 to 2014 regarding joining of plastics and metals have been studied. Some of them are presented below. Rooparani et al [1], (2007), discussed about the modal and harmonic analysis of various horn profiles such as catenoidal, stepped, cylindrical, Gaussian and Bezier and analyzed the amplitude gain at output end and Von Mises stresses developed on the horn. To validate the simulated results five different horns are made of aluminum alloy and experiments are conducted. Standard ABS plastic parts are welded and the temperature developed at the joint is recorded using sensors and Data acquisition system. It was observed that highest temperature at the interface is obtained when using Bezier horn and welded joint had higher strength as compared to other horn profiles. The difference in the simulated and measured temperature value for stepped horn is 50% and Bezier horn is 40%. It was observed by tensile testing that weld strength is

with increase in interface increased temperature. The stepped horn had only 75% energy utilization as compared to 85% of the Bezier horn. The horns like Cvlindrical. Gaussian and Catenoidal which are found to have an amplitude gain of less than or equal to two can be used for applications involving amorphous polymers and moderately strong joints. The stepped and Bezier profile horns which are having an amplitude gain of three can be used for applications involving semi-crystalline polymers and for welding components in the far field. But among the two Bezier is preferred because of low Von Mises stress in the nodal region and better energy utilization. It is observed that Bezier horn profile is having maximum displacement followed by the stepped horn and the catenoidal horn. As the end diameters of the horns are same, it is evident that the amplitude gain depends on the horn profile.

In the work of Ramani, (2004), adhesion between low-carbon-steel and injection-molded poly-carbonate was investigated. They revealed that the fast cooling leads to the development of higher residual stresses and they found that extent of residual stresses can be greatly reduced by proper design of the injection over-molding process.

In the work of Sasaki et al, (2006), adhesion of injection over-molded polyamide 6 (PA6) thermoplastic polymer and stainless steel plates pre-coated with triazinetrithiol polymer (TTP) was investigated. Adhesion strength between PA6 and the pre-coated 417 stainless steel plates was found to be relatively large. They also revealed the formation of iron and the stainless steel. Furthermore, formation of chemical bonds through nucleo-philic substitution terminal amino groups in PA6 was observed.

Laput [10], (2012), they discussed about adhesives for assembly of hard to bond plastics and found that polyolefin plastics are the most common type of hard to bond plastics due to their low surface energy.

Bolt [11], (2014), performed an experimental study to examine the application of displacement controlled Ultrasonic Plastic Welding (UPW) during creation of joints between aluminium or steel and carbon fiber reinforced polyamide 6 [CFR-PA6].

Dunn [12], (2012), performed welding in resin by catalytic bond exchange reaction and found that longer holding at higher temperature will yield better recovery of properties and it is suitable to repair polymer structure and recycle the thermoset waste in engineering applications.

Menon [13], (2011), The main ambition was to study the bonding characteristic between stainless steel and silane layer. Silanes are the most common coupling agent for metal to plastic bonding. They found that characterization of interfacial zone between stainless steel inserts and silane depends more on various properties of stainless steel and silane solutions.

Eckel [14], (2001), This report studies the feasibility of a new technique whose advantages overcome the drawbacks of using mechanical fasteners or chemical adhesives for joining thermoset (TS) composites. This new technique is also called as fusion bonding where two thermosets are joined in shorter time.

Grewells [15], (1994), This paper provides general introduction to welding of plastics and its developments, followed by discussion about ultrasonic welding and also about other different types of welding.

Grujicic [16], (2007), found a method of joining a thermoplastic material to a thermoset material and a resultant thermoplastic-thermoset composite formed from such method are studied. At least one of the thermoplastic material and the thermoset material includes particles sulpho glass or sulpho-phosphate glass particles that melt, when the thermoplastic material and the thermoset material are heated during the joining operation. The particles further produce a solid bond between the materials after the particles have been solidified during cooling, after the joining operation and finally thermosetthermoplastic joined composite is obtained.

This bonding technique is also known as a fast welding technique where in the order of seconds an effective joint is created by means of fusion bonding of thermoplastics.

This is a result of visco-elastic heating, interfacial friction induced by perpendicular ultrasonic vibrations of a sonotrode which is pressed over the weldina overlap. The potential of application of this welding technique lies in reduction of joining times in assembly line, while maintaining high joint strengths with low variation and also they found that the welding strength for hybrid welds was higher when compared to the non-hybrid weld for same input.

In this paper they have compared selected properties of plastics, metals and the results determine applications of joining of moulded pieces from plastics and metal element. Metal inserts are applied for the improvement of some strength properties in mould pieces from plastics. From this they revealed that plastics have several times greater coefficient of heat expansion and contraction is several times greater than that of metals in the range of temperatures for transformation of materials and for chilling of mould pieces.

Pereira [17], (2012), This paper describes about the various joining technologies that are used in aerospace applications such as fusion bonding, ultrasonic welding, resistance welding, induction welding and many more. Finally they found out that each method was effective in different applications in different fields and has its own advantages and disadvantages. Nakazawa [18], (1994), describes about the mechanism of adhesion of epoxy resin to cold rolled steel, galvanized steel and galvannealed steel and also the properties were compared using tensile test, shear test, impact test. They found that galvanized steel adhesive joints are inferior to other two steels joints.

Raos [20], (2002), This paper describes about the various process of joining plastics and composites and also about welding evaluations and testing.

PROBLEM IDENTIFICATION AND OBJECTIVE

A. Problem identification

- Conventional method of mechanical fastening (hammering) of metal insert into a plastic part provides very low torsional resistance and tensile strength.
- Weld quality between the thermoplastic part and metal insert mainly depends on temperature at the interface of metal and thermoplastic.
- Proper horn design and material used for horn fabrication plays a vital role in the weld properties and performance(quality) of welding in ultrasonic insertion process. An improper horn design will not develop sufficient temperature at the plastic metal interface for the plastic to plasticize and flow.
- Tensile strength study and thermal distribution study of inserting process is very important to predict the quality of insertion.
- The major problem faced by the industries with respect to ultrasonic inserting process is poor inserting quality of metal into plastic and low weld strength between the metal insert and thermoplastic.

B. Objectives

- To understand the mechanism of ultrasonic Insertion and to study the various process parameters influencing the ultrasonic inserting process.
- To perform modal and harmonic analysis for different designs of brass and stainless steel horns.
- To analyze the deformation for different horn designs and for different horn materials during ultrasonic inserting process using ANSYS software.
- To record thermal images and analyze the thermal distribution in the inserted component.
- To perform tensile testing to determine the ultimate tensile load and breaking load.
- To join thermoplastics with metal inserts through ultrasonic insertion process.
- To produce a hybrid product which overcomes the conventional method of using mechanical fastening to join a metal insert with thermoplastics.

EXPERIMENTAL PROCEDURE

A. Experimental procedure Softwares used,

- Pro Engineer
- ANSYS Mechanical APDL 14.0
- Win Tensile
- CATIA V5R17
- Moldflow Plastics Insight 3.1

Materials used,

- Thermoplastic (ABS)
- Metal Insert(Brass)

Machines/Instruments used,

- Ultrasonic plastic welding machine (1500 W, 20 kHz) manufactured by M/s National Indosonic
- Tensile Testing Machine (Model: TKG-EC-10kN) (ZWICK 1484)
- Thermal Imager

February

Standardized samples were used in all the experiments of ultrasonic insertion. A ZWICK 1484 tensile tester was used to measure the strengths of the joints between insert and the plastic material. Test procedures according to ASTM standard D638-97 (Standard Test Method for Tensile properties of plastics) were used.

When screws or bolts are threaded directly into plastic components, failures can occur due to stripped threads or plastic creep. In situations where joint strength and the ability to assemble and disassemble without degradation of components is required, threaded inserts provide a serviceable component which satisfies the above needs.

Modal and harmonic analysis of four different horns were performed. We kept the length of horn as constant and designed four different horns by varying the taper angle and the stepped length out of which three models turned out to be a failure theoretically. The fourth model was successful after analysis using the software where the frequency and amplitude were both in acceptable range.

When the experiment was performed practically, the brass horn could not insert the metal insert completely inside thermoplastic part, the metal insert was inserted into the thermoplastic partially and hence practically turned out to be a failure too. Here are the parameters for three trials of ultrasonic insertion using brass horn.

•	Trial 1	
	Inserting time	: 2 sec
	Holding time	: 2.5
	Pressure	: 3bar
•	Trial 2	
	Inserting time	: 3 sec
	Holding time	: 3.5
	Pressure	: 3bar
•	Trial 3	
	Inserting time	: 3 sec
	Holding time	: 3.5

Pressure

The failure of ultrasonic insertion using brass horn is due to change in properties due to alloying elements present in brass which makes the brass material incapable to efficiently transmit the vibrations. Since brass horn could not perform ultrasonic insertion we use horn of different material to perform the insertion. Stainless steel horn is chosen to perform the analysis, insertion process and hence the results are compared with that done using brass horn. Modal and harmonic analysis of a stainless horn is made using Ansys software and the theoretical results were successful. Then the ultrasonic insertion is done using stainless steel horn which turned out to be successful. Here is the parameter for ultrasonic insertion using stainless steel horn.

Trial 1

Inserting time : 3 sec Holding time : 3.5 Pressure : 4bar

B. Testing

Then the two tests were performed 1. Tensile testing using tensile testing machine 2. Thermal distribution analysis using thermal imager

- Open the Win Tensile software and create a new file.
- Enter the header details and specimen details like width ,thickness ,load , distance between grips etc and give ok
- The given component is loaded in the tensile testing machine using specially designed fixture
- A M10 bolt is inserted inside the insert and the tightened
- Then the machine is on and give the command "yes" to go online and then press" tear load"
- See when the display in the computer shows zero

- Then go to parameter selection and then perform the test
- Now browse the file and print the required graphs and store them in word

D. Specimen details

Specimen width : 135.40 Specimen thickness : 3.14 Distance between grips : 225

E. Test conditions

- Load at yield
 - Elongation at yield
 - Yield stress
- Elongation at break
- Load at break
- Percentage elongation
- Reduction in cross section area
- Proof stress

F. Thermal distribution analysis

Using thermal imager the value of heat generated on the interface of the metal insert and thermoplastic material is recorded as thermal images. This value is compared with the theoretical value,

Q=(W * €² * È)/2

- Q=average power dissipated
- W=2*3.14*f
- f=applied frequency
- €=maximum strain
- È=loss modulus

Q = $(2^{3}.14^{19032}(44.4^{10^{-6}}/26^{10^{-3}})^{2} * 0.42^{10^{9}})/2$

Q = 73232327.35 J/m³

- Initial gauge length
 Final gauge length
 Initial width
 = 232 mm
 = 250.69 mm
 = 135.39 mm
- Final width = 135.39
- Initial thickness = 3.14 mm
- Final thickness = 3.14 mm
- Peak load = 5.225 kN
- Maximum crosshead travel = 8.23 mm
- Tensile strength =12.29 N/mm²
- Load at yield = 4.208 kN
- Cross head travel at yield = 7.13 mm
- Yield stress =9.90 N/mm²
- Load at break = 0.086 kN

- Cross head travel at break = 18.39 mm
- % Elongation = 8.06%

The peak load is 5.225 kN which is the ultimate load which the component (insert welded with plastic) can withstand before the material at the interface starts yielding. The load at break is 0.086 kN which is the load at which the insert completely comes out of the plastic part. Hence the plastic part with metal insert can withstand a comparable amount load before failure which is achieved by a successful welded joint between the plastic and the metal.

- Emissivity = 0.95
- Background temperature = 22°C
- Image range = 34.3°C to 112.0°C
- Average temperature = 35.8°C
- Temperature at plastic-metal interface = 93.5°C

Temperature at plastic-metal interface of the component is 95.7°C which is approximately closer to 105°C where 105°C is the approximate (ABS being amorphous has no true melting point) temperature required temperature for the plastic to plasticize which is required for the plastic to flow and fill the grooves and flutes of the insert completely without any air gaps by which a successful welded joint is achieved on cooling.

CONCLUSIONS

- 1. A detailed process study is done on Ultrasonic plastic welding and inserting process and its guidelines.
- 2. Carried out a study on the specification of the system.
- Modal and Harmonic analysis of different horns of two different materials (Brass and Stainless steel) have been performed.
- 4. Ultrasonic insertion of metal insert into thermoplastic is performed experimentally.
- 5. Thermal distribution of the insertion process is analyzed by both theoretical and practical methods using thermal imager.

 Tensile testing of the component is made by which ultimate tensile load and breaking load of the metal insert and thermoplastic is determined.

FUTURE SCOPE

- Design and fabrication of fixture for holding different inserts.
- Design and fabrication of horn in Stainless steel and Aluminium.
- Optimization of various inserting process parameters.
- Interpretation of results.

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98

SI.No	Description	Value
1	Maximum capacity	10KN
2	Least count displacement	0.1 mm
3	Accuracy of load	+1% of indicated load from 4% to 100 or load cell capacity
4	Grip separation	25-75 mm
5	Straining rate	1 mm/min to 100 mm/min
6	Power	Single phase 220v 50 Hz AC
7	Motor	0.5Hp

Table 1: Tensile Testing Machine Specifications

Table 2: Ultrasonic Plastic Welding Machine Specifications

SI. No	Description	Value		
1	Make	Ultra weld, National Indosonic, Pune		
2	Input power	230V,50Hz Single phase		
3	Output power	1500W		
4	Output frequency	20 kHz		
5	Max. Amplitude	60 microns		
6	Max. Pressure	10 bar		
7	Stroke length	100 mm		



Figure 1: Ultrasonic insertion process setup

Plastics are based on polymers and they are created by bonding monomers together.

Monomer:



A monomer is a small molecule that combines chemically to other monomers to form a polymer.

Polymer:



Example: An ethylene monomer forms a long chain monomer due to individual ethylene monomers joined together. This produces the polymer polyehtylene.

Figure 2: Chemical bonding in monomers and polymers



Figure 4: Ability to join different materials



Figure 5: Methodology



Figure 6: Ultrasonic Plastic Welding Machine



Figure 7: Thermoplastic part model



Figure 8: Thermoplastic part fill time



Figure 9: Thermoplastic part temperature (3D)



(a) First design



(b). Second design



(c) Third design





Figure 8: Different Brass horn designs - Part models



Figure 9: Failed modalanalysis for brass horn of first design



Figure 10: Failed harmonic analysis for brass horn of first design



Figure 11: Failed modalanalysis for brass horn of second design



Figure 12: Failed harmonic analysis for brass horn of second design



Figure 13: Failed modal analysis for brass horn of third design



Figure 14: Failed harmonic analysis for brass horn of third design



Figure 15: Successful modalanalysis for brass horn of fourth design



Figure 16: Successful harmonic analysis for brass horn of fourth design







Figure 18: Tensile Testing Machine (TKG EC 10 - kN)

PSG College Of Technology, Peelamedu, C	oimbatore.641004
Tensile Test Report	

Machine Model : TKG-EC-10 Filename : ID2EXP9.Utm	DkN	Machine Serial No : Date :	2010/31
Customer Name Order Number Lot Number Heat Number	: Balancing Instruments	& Equipment Pvt Ltd	
Initial Gauge Legath (L0)	· 232 mm	Peak Load Max. C.H.Travel	: 5.225 kN : 8.23 mm
Final Gauge Length (L1)	: 250.69 mm	Tensile Strength	: 12.29 N/mm2
Inital Width Initial Thickness	: 135.39 mm : 3.14 mm	Load at Yield C.H. Travel at Yield Yield Stress	: 4.208 kN : 7.13 mm
Final Width	: 135.39 mm	Load at Break	: 0.086 kN
Final Thickness	: 3.14 mm	C.H. Travel at Break	: 18.39 mm

% Elongation : 8.06 %

Test completed due to Specimen Break



Figure 19: Stress Vs Elongation graph

PSG College	Of Technolo	gy,Peelamedu	Coimbatore.641004	
2007-01-0070-	Tensile Te	est Report		

Machine Model : TKG-EC-10kN Filename : ID2EXP9.Utm		Machine Serial No : 2010/31 Date :	
Customer Name Order Number Lot Number Heat Number	Balancing Instruments & Equipment Pvt Ltd		
Initial Gauge Legath /L 0)	· 232 mm	Peak Load Max. C.H.Travel	: 5.225 kN : 8.23 mm
Final Gauge Length (L1)	: 250.69 mm	Tensile Strength	: 12.29 N/mm2
Inital Width	: 135.39 mm	Load at Yield C.H. Travel at Yield	: 4.208 kN : 7.13 mm
Initial Thickness	: 3.14 mm	Yield Stress	: 9.90 N/mm2
Final Width	: 135.39 mm	Load at Break	: 0.086 kN
Final Thickness	: 3.14 mm	C.H. Travel at Break	: 18.39 mm

% Elongation : 8.06 %

Test completed due to Specimen Break

Tested By



Figure 20: Load Vs Elongation graph

PSG College Of	Technology, Peelamedu, Coimbatore. 641004
	Tensile Test Report

Machine Model : TKG-EC-10kl Filename : ID2EXP9.Utm	4	Machine Serial No : Date :	2010/31
Customer Name Order Number Lot Number Heat Number	Balancing Instruments	& Equipment Pvt Ltd	
Initial Gause Length (L0)	· 232 mm	Peak Load Max. C.H.Travel	: 5.225 kN : 8.23 mm
Final Gauge Length (L1)	: 250.69 mm	Tensile Strength	: 12.29 N/mm2
Inital Width Initial Thickness	: 135.39 mm : 3.14 mm	C.H. Travel at Yield	: 7.13 mm
Final Width Final Thickness	: 135.39 mm : 3.14 mm	Load at Break C.H. Travel at Break	: 9.90 N/mm2 : 0.086 kN : 18.39 mm

% Elongation : 8.06 %

Test completed due to Specimen Break

Tested By



1

Figure 21: Stress Vs Strain graph



Figure 22: Thermal image indicating thermal distribution

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Leadership and Motivation in us Multinational Corporations Operating in Singapore

Rugaya M. Gaus, University Islam Antarabangsa, Malaysia Manzoor Ali Mirani, University Tun Abdul Razak, Malaysia **M.S.B. Siddiq,** University Tun Abdul Razak, Malaysia

Abstract

With the advent of contingency theories of leadership, it has become clear that no particular style of leadership is effective in all situations. This study attempts to identify factors such as the impact of culture and economic ideology on managerial values and leadership styles among mangers in US based multinational corporations operating in Singapore. The results of supported the cross-vergence perspective according to which the Singaporean managers were able to reconcile the dynamics of culture and the imperatives of economic and political ideologies with a distinct degree of uniqueness. This might become a new hybrid notion of leadership style in the region. From the findings of this study, it can be summarized that the sample of Singaporean managers exemplified a national character dictated by values of individualism and masculinity, low power distance and less orientation towards uncertainty avoidance. The personality type that dominated among the respondents was the Sensing, Thinking and Judging (STJs) types- particularly suited for the environment of large organizations such as multinational organizations. The study identified a diffusion of values, economic ideologies and demands from the corporate culture as major variables, influencing the process of achieving organizational goals. Given traditional depiction of eastern societies as being more tolerant of authoritarian style of leadership, one would expect a preference for directive style of leadership. However, a participative style seems to be equally appealing among the mangers.

Keywords: Cultural Dimensions, Personality Dimensions, Values and Managerial Behavior, Confucian Dynamism, Organizational Culture, Leadership Theories

INTRODUCTION

As a stable and economically successful Pacific Rim country, Singapore continues to be viewed as an attractive site for American commercial activity. Thus it is reasonable to expect that increasing numbers of expatriate mangers will eventually be exposed to the business environment of Singapore. Second, as a former British colony, Singapore's culture is unique. It remains much more Eastern than Western in nature. Singapore has a multicultural workforce and is predominantly Chinese. The socio-cultural belief system of this group is underpinned by principles of Confucianism, which is believed to have contributed to the success

of high performing economies of East. The significant feature of Singapore's development strategy has been its continuous efforts to attract MNCs to undertake manufacturing and service operations for regional world markets.

The remainder of paper presents literature review, research methodology, discussion of results and conclusion.

LITERATURE REVIEW

Most companies, despite their countries of origin, manage their international operations around two main "United Nations" structures- the (UN) model and the "Headquarters (HQ) Hierarchy Syndrome". In the first approach, the headquarters treat all its foreign

а uniform subsidiaries in manner organizational (symmetrical approach). Despite the wide differences in importance of operations in different markets. subsidiaries' roles and responsibilities are expressed in the same general manner. Planning control systems are applied uniformly system-wide, country managers are involved to high degree in planning and subsidiaries are evaluated against standard criteria (Bartlett and Ghoshal, 1989). Similarly in HQ syndrome, two roles are envisioned for the organization, one for the headquarters and other for the national subsidiaries. The HQ's role is to coordinate key decisions and control global resources, while the subsidiaries act as implementers and adapters of the global strategy in their localities (Bartlett and Ghoshal, 1989). Although operations in some countries require MNCs to significantly localize procedures and policies, but the MNCs in Singapore operate without significantly localizing most of aspects of their operations and enjoy relatively high levels of autonomy (Chan, 1989). In US MNCs, headquarter holds a parochial and superior attitude towards subsidiaries and perceived the foreign operations role as leveraging the capabilities and resources developed in home market (Bartlett and Ghoshal, 1992). This exchange between HQ and subsidiaries is mainly in the form of knowledge flows (technology products, processes and systems). Foreign subsidiaries are free to adapt products or marketing approaches to their local situations as they see fit. Therefore, a maior challenge of doing business internationally is to adapt effectively to different cultures. Such adaptation requires an understanding of cultural diversity, perceptions and values.

Cultural context for international management: Hofstede's cultural dimensions

Culture comprises the acquired knowledge that people use to interpret

and social experience to generate behaviour (Hodgetts and Luthans, 1994). This knowledge forms values, creates attitudes influences and behaviour. Hofstede defined culture as " the collective programming of the human mind, obtained in the course of life, which is common to the members of one group as opposed to another" (Hofstede, 1980, 1983). Hofstede (1980) further explained cultural based value system according to four dimensions: power distance. collectivism versus individualism. masculinitv versus femininity, and uncertainty avoidance.

Individualism vs. Collectivism

In an individualistic organization, employees are expected to act according to their own interest. Hofstede (1991) suggested that work should be organized in such a way that self-interest and the employers' interest coincide. At such an organization, workers will be motivated to work independently; there will be competition among employees for recognition and rewards, and lack of social relationships among employees. On the contrary, collectivism in an organization is reflected in team work, lack of competition encouragement of among individuals, conformity, consensus decision making, cooperation and collaboration and interdependence of activities. Hence leadership operating in collectivist cultures should respect and encourage employees and group loyalties; and incentives should be given collectively.

Hofstede (1984)found that collectivist Singaporeans are and suggested a centralized type of decision making structures. In a comparative study of Singaporean based subsidiaries of US multinational and Singaporean firms. Singapore scored relatively low on individualism index and many Singaporean firms endorsed an authoritarian style of management (Wyatt, 1988). However, Ching-Ling (1980) as cited by Hackman and Kleiner (1990) argued that

Singaporeans are becoming more individualistic specifically young Singaporeans between the ages of 15and 24 years are highly individualistic.

POWER DISTANCE

Hofstede (1991) defines this dimension as "the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally". This dimension measures a society's emphasis on human inequalities. A culture high in power distance would value hierarchical status and authority. In this culture, superiors and subordinates feel relatively comfortable with shared decision making and decentralization. Hofstede's subsequent research revealed that some societies high in power distance nevertheless embrace systems that reward social differentiation. This result implies a upward mobility within a value on centralized or hierarchical environment.

In organizations with large power satisfaction, superiors and subordinates consider each other as unequal. Hofstede (1991) observed that such organizations centralized power in a few hands resulting in the exercise of close control and directive supervisory behaviour. In this culture, rank and position in the hierarchy offer special privileges.

MASCULINITY

Hofstede (1991) defines masculinity as "a situation on which the dominant values in society are success, money and things". Countries such as Japan, with a high masculinity index place great importance earnings, recognition, on advancement and challenge. Individuals encouraged to be independent are decision makers and achievement is defined in terms of recognition and wealth. Cultures with a high masculinity index tend to favour large scale enterprises and economic growth is seen as more important than conservation of the environment.

Unlike Americans who are masculine, Singaporeans are described by Hofstede (1980) as slightly feminine. However, Hackman and Kleiner (1990) argued that there is an increase in the masculine value of competitiveness among Singaporeans due to the educational streaming of the young and the development of meritocracy in both the public and private sectors. Singapore's economic growth produced increased aspirations of upward social mobility which resulted in material wealth, another masculine value, being accorded as sign of success.

UNCERTAINTY AVOIDANCE

Hofstede (1991) defines uncertainty avoidance as "extent to which the members of a culture feel threatened by uncertain or unknown situations". Author pointed out that instead of tolerating uncertainty, a society or organization can uncertainty by the use reduce of techniques such as reliance on ideology and rituals, policy and procedures. Respect for wisdom, traditions and seniority, and resistance to change or innovation are other uncertainty reduction techniques. Uncertainty avoidance is "the extent to people which feel threatened by ambiguous situations and have created beliefs and institutions that try to avoid these" Countries with high uncertainty avoidance cultures have a great deal of structuring of organizational activities, more written rules, less risk-taking by managers, lower labour turnover and less ambiguous employees.

A description of four dimensions of culture is useful in helping explain the differences between various countries, and Hofstede's research has extended beyond this focus and shows how countries can be described in terms of pairs of dimensions. Americans have very high individualism and relatively low power distance. Conversely, Honk Kong and Singapore are characterized by large power distance and low individualism (Hofstede, 1980).

Values and Managerial Behaviour

Values, according to Rokeach (1973), are a set of enduring beliefs that have an impact on an individual's display of certain behaviours. Hofstede (1980) suggested that shared values persist over time and are fairly stable within cultures because of institutionalism. As such they are often long lasting and would not be subjected to the same temporal and situational instability that is typical of personality and demographic variables. These values are learned from the culture in which the individual is reared, and they help direct the person's behaviour. Differences in cultural values often result in varying management practices (Harris and Moran, 1991). There has been substantial literature that supports the evidence of a positive relationship between a manager's personal values and his decision-making (England and Lee, 1974).

The intercultural studies show that there are both differences and similarities between work values and managerial values of different cultural groups. Differences in work values have also been found to be a reflection of the stage of industrialization. At the same time, however, research shows that managers from different countries often have similar personal values that are related to success (England and Lee, 1974).

Confucian Dynamism

The traditional Chinese in Singapore strongly value and adhere to a hierarchical relationship in society, as a result of Confucian teaching. They see society as composed of people who are inherently unequal in rank and standing, and differences in rank are signalled and reinforced by the style of interaction between the parties involved. Deference, respect and formality towards superiors are the Hence, subordinates norm. in Singapore are unlikely to question authority and are less likely initiate upward communication unless requested to do so

because its culture values the importance of status, differences and hierarchies. In Singapore family is the core of society and is its single most important unit. The traditional Asian value of family ties remains paramount to the average Singaporean. Hence, it is not surprising that it is the group rather than the individual that is emphasized in traditional Singaporean Chinese society. Hofstede and Bond (1988) found that the Confucian dynamism dimension was strongly correlated with the economic growth and argued that higher Confucian dynamism led to higher economic growth.

Leadership Behaviours and Styles

Leadership is defined as the process of influencing people to direct their efforts toward the achievement of some particular goals (Hodgets and Luthans, 1994). Leadership behaviours can be translated into three commonly recognized stylesauthoritarian, paternalistic and participative:

- Authoritarian leadership is the use of work-oriented behaviour designed to ensure task accomplishment. This leader behaviour typically involves the use of one-way communication from superior to subordinate.
- (2) Paternalistic leadership uses workcentered behaviour coupled with a protective employee-centered concern. This leadership style can be best summed up by the statement, "Work hard and the company will take care of you."
- (3) Participative leadership is the use of both a work-centered and people-centered approach. leaders Participative typically encourage their people to play an active role in assuming control of work, and authority their is commonly highly centralized. Participative leadership is very

February

popular in many technologically advanced countries like US.

Leadership behaviour must also be appropriate to the situation in which the task is taking place. Such variable include sun ordinates' experience, motivation and knowledge, the organizational culture, and environmental factors in which the organization is situated.

Contingency Theories

Contingency theories of leadership assume that different styles and different leaders are more appropriate for different situations. Two contingency theories of leadership: Fielder's theory of leadership and path-goal theory identify several factors that influence the effectiveness of different leadership styles in different situations. They also provide the basic framework that MNC managers can use to adapt their leadership styles to work in different national contexts.

Fielder's theory of leadership proposed that the success of a task or person-centered leader depends on relationships between the leader and his subordinates; the degree that subordinates' tasks are easily and clearly defined; and the officially granted organizational power of the leader (Fielder and Garcia, 1987). Path-goal theory identifies four types of leadership and the international factors that determine the best leadership styles:

- *Directive style*: Give subordinates specific goals, schedules and procedures.
- *Supportive style*: Show a concern for satisfying subordinates' needs and establishing good relationships.
- *Participative style*: Consult with subordinates; ask for suggestions; encourage participation in decision making.
- Achievement-oriented style: Set goals, reward goal accomplishments.

Leadership works different national contexts. Accordingly, this contingency view of leadership suggests that managers cannot assume that the leadership styles that worked successfully in their home country will result equally successful leadership in a foreign country. For example, the highly involved "hands-on" leadership style that worked very well in the United States had little impact on the performance of Hong Kong workers (Black and Porter, 1991).

Leadership in Singapore

There is a widespread recognition that leadership theories based on Western values are not appropriate worldwide (Hofstede, 1991). Hence, the kind of leadership that is effective in US may not be as effective when used in Singapore. Knowledge of the implicit leadership theory accepted by the Singapore work culture will be useful for understanding how business leaders in Singapore can be effective and the constraints imposed on leaders by societal and organizational cultures.

Redding and Richardson (1986) found that participative management in Singapore is positively correlated with high productivity because of MNC influences, while this relations hip is not found in Honk Kong probably because the enterprises there remain non-bureaucratic, that is non-Western. A study on perceptions of appropriate leadership styles: participation vs. consultation, Campbell, Bommer and Yeo (1993) suggested that there was strong preference for participative leadership over the consultative approach by business respondents both in Singapore and North America. Putti and Chong (1985) argued that there were distinctive features of management practices in Japanese and American firms operating in Singapore, the Japanese firms have implemented theirs to a minimal degree in Singapore, on the other hand the US firms seemed to be able to implement theirs to a

very large extent. This can be accounted by the fact that Singapore's development has all long been based on individualistic competition and meritocracy which has been reinforced by the largely Western education system.

Like the US, Singapore is a unified vet heterogeneous nation, with an environment that focuses on the development of independent thought, competition and elitism, specialization and speedy decision-making. Thus, the Americans do no find much difficulty in transferring their practices, though the spectrum of management styles in the US firms are very wide. Ultimately, each multinational manger must diagnose the institutional, organizational, and cultural situations that may affect the success of his or her leadership style. Too many contingencies exist to predict what may work in all situations faced by multinational managers. However, successful global leaders remain flexible and highly sensitive to the national contexts.

Hypothetical Framework

This study aims to capture the extent of convergence and/or divergence in management practices and values which affect leadership styles adopted by Singaporean managers and their foreign counterparts. Hofstede (1991) argued that cultural values and management practices must be consistent with one other. In addition, leadership patterns that are successful in one culture may not work well in another. Specifically, four hypotheses were proposed to relate cultural values to behaviour and leadership initiation.

In Hofstede's definition of the individualism dimension, He proposed that highly individualistic groups manifest greater assertiveness in meeting personal goals. Given the Singaporean managers' motivation to excel under societal and governmental pressures, it is likely that the Singaporean managers will selfishly guard his position. This study attempted to examine whether the Singaporean respondents have equally high individualism scores compared to foreign respondents; and determine whether the findings in the Singaporean context were similar to those of Hofstede's results.

Hypothesis 1: Singaporean managers are equally individualistic compared to expatriate managers.

The Singaporean workforce of today comprises mainly younger and Western educated adults who have been more exposed to Western democratic and egalitarian principles. In cultures that are low on Power distance dimension, status differences are considered undesirable (Chew and Putti, 1995). Status tends to be achieved based on the personal merit of the achiever. Based on this argument, Singaporean sample should reflect a low Power distance score. Hofstede (1980) did not support this finding.

Hypothesis 2: Singaporean managers are equally low on Power distance compared to expatriate managers.

According to Hofstede and Bond (1988), Eastern thinking is characterized by "Confucian Dynamism". This suggested that Chinese culture should reflect low Uncertainty Avoidance. Singaporeans have been constantly conditioned by survival instincts to exhibit an overall propensity to take challenges given the small size of the country with no resources except its people (Chew and Putti, 1995). According to Hofstede's study, Singapore exhibited higher Uncertainty Avoidance scores than the US sample. The following hypothesis attempts to examine which national group would be more secure in the face of future uncertainties.

Hypothesis 3: Singaporean managers are less oriented to Uncertainty Avoidance that expatriate managers.

Hofstede defined the Masculinity Index as the extent to which respondents in a country tend to endorse goals that are usually more popular among men. In an open society like Singapore, the people have become more receptive to the smaller social distance gap that typically exist between men and women in the West (Chew and Putti, 1995). Attitudes regarding sex role expectation may not be viable in a changing society which upholds values of meritocracy (Tham, 1984). There are equal opportunities for men and women to excel in Singapore. This concept of narrowing of social sex roles among Singaporeans is expected in the following hypothesis.

Hypothesis 4: Singaporean managers are more oriented to masculinity than expatriate managers.

RESEARCH METHODOLOGY

Data were collected from 150 managers Singaporean working in electronics and information technology related sectors. The sample comprises 36 American MNCS working in Singapore. A total of 500 guestionnaires were distributed with a response rate of 30%. The instrument was divided into two parts. The first part of questionnaire comprised Myers Briggs Type Indicator (MBTI). This indicator identifies 16 different patterns of personal preferences and actions which were based on four dimensions: extroversion vs. introversion (E or I), sensing vs. intuition (S or N), thinking vs. feeling (T or F) and finally judging vs. perceiving (J or P). The second part of questionnaire comprised eight statement aligned along Hofstede's (1980) four cultural dimensions: Uncertainty Avoidance, Individualism, Power Distance and Masculinity. Organizational culture is measured through the "Cultural Assessor" developed by Blohowoiak (1999).

RESULTS AND DISCUSSION

The sample consisted of 83% male and 17% female managers are generally middle-aged with 22% less below 35 years of age and 48% below 45 years. The majority of respondents 59% are Chinese followed by 27% foreigners, mostly Singaporeans. There is a small portion of Malays and Indians. The sample is fairly distributed across education level and different levels of management. Table 1 provides the details.

Cultural Dimensions

The findings of this study do no conform to Hofstede's study. Hofstede (1980) found a low score of 20 points for Singapore on the Individualism index. His findings suggested that Singapore was relatively collectivistic compared to Western countries like USA. The sample of showed Singaporean respondents relatively high individualistic orientation but still lower compared to their foreign colleagues. The Bonferroni t-tests indicated significant differences between expatriate and Singaporean managers (t=5.46, F=42, df=148, p<.05), with mean scores for expatriate managers significantly higher than for the Singaporeans. Findings of this study are consistent with Triandis's (1998) study which showed increasing individualism in collective societies. Although the traditional Singaporean might still display elements of collectivism due strong family to centeredness typical of Asian values, organizational culture. economic and political ideologies would erode the effect over time.

Singaporean managers showed equally low power distance. The Bonferroni tests found that the expatriate and Singaporean managers to be not significantly different (t=0.72, F=3.73, df=148, p>.05). These findings differ from Hofstede (1980) study which indicated a relatively high score for the Singaporean. An implication of this finding will be that the smaller perceived power distance will be manifested in the preference for a more consultative type of leadership style (Chew and Putti, 1995). An open door policy of management will facilitate clear lines of communication where subordinates can bring their grievances to their superiors.

Another implication is that areater effectiveness can be derived from a more decentralized decision making structure. Hofstede (1980) suggestion that US score was higher than Singapore on the Uncertainty Avoidance was not confirmed by the findings. The expatriate and Singaporean managers were not significantly different (t=1.21, F=159, df=148,p>.05). Both groups registered scores of about average mean (Singaporean: 2.74 and expatriate: 2.5). Singaporeans beainnina are to demonstrate a relatively low aversion to risk and changes. An implication of this effect will be the Singaporean government's efforts in encouraging greater entrepreneurial ventures as well as increasing emphasis on the subject in the management schools of local universities. Singaporean respondents scored relatively high in masculinity with an above average mean score of 3.0. A significant effect was identified between the two groups of (t=-2.79, F=0.255, managers df=148, p<.05).

Despite the existence of sexual equality, the high masculine scores among Singaporean managers reflected a need to perform and assert oneself. They are more highly oriented towards fulfilling intrinsic work goals that allow them to meet selfesteem. The managerial implication of strong masculine value will be that intrinsic factors like career advancement, autonomy and learning new skills be given additional emphasis in order to enhance motivation. The provision of such intrinsic rewards is often effective because the managers have high levels of assertiveness.

Personality Dimensions

For US expatriates, a high score was noted for "extroversion". Singaporean managers, on the other hand, scored low on "E" scale but were above average implying that they still qualified as "extroverts". This confirmed earlier studies (Ditzig and You, 1988) that Singaporeans working in American MNCs are more extroverted. As would be expected, given the mean values, the Singaporean and expatriate managers were significantly different (t=-15.38, F=2.36, df=148, p<.05). As discussed, extroverts among other characteristics like to have people around them and usually can communicate feely. These findings can conclude that the expatriate managers are more adaptable to Singaporean values and the norms. Another predictor. country distance. influences the adjustment, which is the extent to which the host country is culturally different from an expatriate's home culture. The fact that Singapore shares many similarities with the US, the cultural distance is not too great. This explains why the success rate recorded for expatriate assignments to Singapore is relatively high.

For Sensing vs. Intuitions, significant differences were found between Singaporean and the expatriate the managers (t=-3.28, F=10.78, df=148. p<.05). The foreigners scored a higher "S" compared to the locals. These findings unexpected because generally were managers at higher level tend to belong to the Ns. Ss focus on the presents while Ns focus on the future. This could be influenced by the expatriate's relatively short span of time spent in the host country.

For Thinking vs. Feeling, the majority of the Singaporean managers scored high on T. The scores for foreigners were also above average. There were significant differences between the two groups (t=3.67, F=13.52, df=148, p=<.05). T types of personality are more analytical and are commonly found in large corporations.

In terms of Judging vs. Perceiving, the respondents were almost equally high on Js. As expected from means, two groups were not significantly different (t=1.59, F=2.54, df=148, p>.05). Js like to plan and get things done but dislike interruption. MNCs generally have high percentage of Js.

On personality dimensions, the Singaporean managers in the sample were less extroverted than their American colleagues. Their personality profile fell under category of "STJ" type. As revealed by previous studies (Ditzig and You, 1988), this profile presents the national personality type. The characteristics of this type are: being factual, thorough, systematic, dependable, practical. organized, realistic, duty-bound, sensible, reliable, efficient, decisive, impersonal, structured and conscientious.

Organizational Culture

Using the "Cultural Assessor" as a measuring instrument, the following characteristics were noted:

- On "corporate mission", not all organizations were able to communicate their mission effectively to the employees. (Fifty percent of managers shared this view)
- A "directive style" of management was clearly the choice among the locals while the foreigners put a higher weighing on the supportive style.

Due to the rapid technological advancement taking place in the electronics sector that require prompt responses, the decision-making climate among the resp0ndents displayed a high percentage of "spontaneity".

With increasing competition and pressure to excel, it would not be surprising to detect a "hectic pace" in the working environment. Almost 70% of the local respondents described the pace of work as "fast". Besides being consistent with the masculinity dimension, these findings also concurred with Pearson and Entrekin (1997) view that management practices in Singapore are "heavily driven by guality movement and that the corporate sector has transformed into a highly competitive one". On risk orientation, respondents generally rated high on "prudence" although "gusty" received a relatively high score, reflecting the willingness to accept risk and face uncertainties. This is consistent with low uncertainty avoidance dimension.

Singapore has traditionally exemplified a collectivist culture because the Chinese culture is strongly relationshipcentered with high regard placed on personal relationships and the maintenance of social harmony. The findings are consistent with the view that Singaporean manger arte "co-operation" and "colleagues" higher than the US group of managers. This is despite the individualistic nature of the Singaporean respondents. Excessive individualism or collectivism may serve to inhibit innovation a facet highly endorsed in industries like electronics.

People in Anglo-American cultures are socialized to explore and express their individuality. In contrast, Chinese children are socialized in a climate of dependence and conformance (Ho, 1986). More emphasis is placed on people's acceptance of and acceptance to their role in clearly structured hierarchies than upon individual initiative and creativity. The findings therefore confirmed that the Anglo-Americans gave greater weight to the traits of "creativity" and "flexibility" than their Singaporean counterparts.

Organizational growth is common and widely shared business goal therefore all groups showed relatively high ratings. The Chinese proposed strong drives to gain security to acquire independent wealth. Therefore, a strong money drive and a high level of materialism were noted (Redding, 1990). Results of a previous study supported this view, including that Anglo-Americans placed a higher value on intrinsic motivators than Singaporeans.

CONCLUSION

The findings reveal that the sample exemplified a national character dictated by values of individualism and masculinity, low in power distance and less orientation towards uncertainty avoidance. The personality type that dominated among the respondents was the STJs typeparticularly suited for the environment of large organizations such as the MNCs. A diffusion of values, economic ideologies, and demands from the corporate culture has influenced the process of achieving organizational goals. The findings have significant contributions on the government, corporate and individual levels. Findings showed that expatriates contribute in Singapore by cultivating the local workforce, especially local managers. They will be able to manage and transmit the best practice system. On the corporate level, findings could serve as a criterion for selection of managers, especially in an environment where participative management is desired and where there is convergence or crossvergence of values exists. By incorporating questions with respect to candidates' beliefs and attitudes in the selectin process, the company should be better able to single out potential candidates who will thrive in the environment. The findings of the study offer insights into the range of opportunities and constraints facing local managers who are already employed or wish to seek employment in MNCs operating in Singapore.

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Demographic	Frequency	Valid Percent
	N= 150	%
Gender		
Male	125	83
Female	25	17
Age		
< 35	33	22
36-45	72	48
46-55	39	26
>55	6	4
Race		
Chinese	88	59
Malay	7	5
Indian	14	9
Foreigners	41	27
Education		
A Levels/Diploma	39	26
Graduate/Degree	64	43
Postgraduate	47	31
11 years and above	25	8.20
Organizational Leve		
Lower Management	45	30
Middle	66	44
Upper	39	26
Organizational Size		
<100 workers	16	11
101-999	45	30
>1000	89	59

Table 1: Demographic characteristics

Table 2: Contrast for Hofstede's Dimensions

	Mean Scores	
	Singaporean	Foreigner
Uncertainty Avoidance	2.72	2.50
	(0.83)	(1.52)
Power Distance	2.70	2.53
	(1.29)	(1.19)
Individualism	3.04	3.81
	(0.80)	(0.63)
Masculinity	3.05	3.48
	(0.86)	(0.69)

Note: The values in parenthesis are the standard deviations of means

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Table 3: Personality Dimensions, Means and Contrast			
	Mean Scores		
	Singaporean	Foreigner	
Extrovert	2.80	4.18	
	(0.50)	(0.42)	
Sensing	3.14	3.75	
	(1.07)	(0.77)	
Thinkers	3.76	3.23	
	(0.67)	(1.00)	
Judgers	3.02	3.26	
	(077)	(0.87)	

Note: The values in parenthesis are the standard deviations of means

FAME production from Jatropha oil using lipase enzyme from *Aspergillus terrus*

Narasimhan V Research Scholar, Department of Biotechnology, Sathyabama University, India,nars_28@yahoo.co.in, 9962251267 Valentin Bhimba B Department of Biotechnology, Sathyabama University, India, bvbhimba@yahoo.co.in,9840735987 *Corresponding author

ABSTRACT

Biodiesel from vegetable oils is considered as a better substitute for the fossil diesel due to their sustainability and cleaner fuel characteristics. Worldwide production through chemical conversion is an energy consuming process. Alternative, bio catalytic conversion routes are being continuously tested for their feasibility. Lipase enzyme based bio catalytic conversions are known to be energy efficient and cleaner method of biodiesel production from vegetable oil than the acid-base catalyzed chemical method. Identification of microorganisms that produce a cost efficient lipase enzyme is being tried. Lipase enzyme produced from *Aspergillus terrus* fungal strain, was used as the catalyst. The optimization of enzyme concentration, temperature and methanol flow rate were carried out with Box-Benhen design of experiments and analyzed by Quantum XL regression analysis. The optimized conditions suitable for the production were observed to be higher concentration of active lipase enzyme, 29° C and a continuous addition of methanol at the rate of 10 ml/h. A simple titrimetric quantification of glycerol- a secondary product was used to estimate the conversion of vegetable oil to biodiesel for the first time.

Key words: Aspergillus terrus, Bio diesel, Conversion, Jetropha oil, Lipase enzyme.

INTRODUCTION

Energy has been fundamental to human survival and growth. There is a close relationship between energy consumption and economic development [1]. Fossil fuels especially petroleum diesel have been the prime sources of energy for transport, pump sets in agricultural sector and electricity production for small consumption [2]. As the fossil fuels are of limited period of availability, development of renewable energy resources have assumed importance throughout the world. India with its agricultural background has good potential for bio fuel and so intends to promote second generation feed stocks and their conversion processes so as to use about 20% of bio-fuel blending

by 2017. Vegetable oils can be transesterified with acid-base catalysts to biodiesel and is adopted worldwide. But the process is energy intensive and purification of the products involves downstream processing steps. Biocatalytic conversion with lipase enzymes is suggested to be a relatively temperature process needing low lesser purification requirements. But a effective commercial lipase cost enzyme to replace the chemical conversion is yet to be evolved. This paper details the experimental results of a bio catalytic conversion of jatropha oil to biodiesel by an Aspergillus terrus derived lipase enzyme. Feasibility of using a simpler method of estimation of glycerol (a byproduct) for biodiesel

February

formations follow up is reported for the first time.

MATERIALS AND METHODS Fungus isolation and characterization

Soil samples contaminated with sunflower oil decomposes were collected near а sunflower oil processing plant. The samples were aseptically transferred and stored. Soil sample was sprinkled over a PDA plate containing antibiotic to selectively grow strains. Differently colored fungal strains were serially diluted and subcultured several times by streak plating to isolate pure stains. Relative lipolytic activity of each strain was tested with Tween-18 and Rhodamine-B containing PDA plates. A brown colored fungal strain that produced relatively highly active lipase was identified to be closer to Aspergillus terreus isolate PKU F22 18S and a next closest homologue as Aspergillus ATU-KSU09 tubingenesis strain internal transcribed spacer 1. The nucleotide sequence is annotated with NCBI accession number of KP715156 [3].

Biocatalytic conversion of jatropha oil with lipase enzyme

A partially purified enzyme having activity of about 124U/ml was used for the trans-esterification of jatropha oil. Jatropha oil was purchased from a NGO associated with the cultivation of jatropha plant and oil production. Analar methanol from Qualigens laboratories was used in the experimentations.

The bio catalytic transesterification of vegetable oil with lipase enzyme was said to be affected by the alcohol. its molar concentration. temperature etc. [4]. A molar jetropha oil: methanol ratio of 1:4, and a rotational speed of 200rpm were kept all experiments. same for Three variables of enzyme concentration, temperature and pumping rate of methanol were optimized for biodiesel yield. Box-Benhen design [5] of fifteen experiments for the three factors at three factorial levels was conducted. About 225ml of jatropha oil was stirred continuously in a 500ml round bottom flask fitted with a water condenser and thermometer.

Estimation of Glycerol content

reaction The is follow up generally by the quantification of the product ester (FAME) by chromatographic analysis. But. biodiesel characterization, in terms of other easily measurable physical properties has also been reported. Glycerol being a byproduct of the esterification reaction will be produced in stoichiometric proportions to ester formation and can be used for the reaction follow up in the place of FAME quantification. Glycerol can be quantitatively estimated by a simple titrimetric procedure (6) compared to the sophisticated equipment requirement the FAME in determination. The simple titrimetric method of estimation of glycerol hence offers a easy method for the follow up of the trans-esterification reaction or for the indirect estimation of fame in the product.

About 10 ml of the reaction mixture was pipetted out into a 250 ml beaker. 100 ml of distilled water was

added and the solution was mixed over a magnetic stirrer. The pH of the solution was adjusted to pH 8 by measuring the pH with a pH meter by dipping a glass electrode inside the solution and adding 0.05N sodium hydroxide solution in drops. 50ml of sodium meta per iodate solution (60g/l) was pipetted out into the beaker. The beaker was covered and allowed to stand for 30 minutes in the dark at a temperature not exceeding 35°C. 10 ml of 1:1 ethylene glycol in water was added and again allowed to stand for 20 more minutes in the dark. 5 ml of the 1N sodium formate solution was added from a graduated pipette. The acid liberated was titrated against hydroxide solution (0.5N). sodium Sodium hydroxide was added slowly from burette to bring the pH of the solution back to 8 and the volume added was noted (V1). A blank titration with 10ml of distilled water in the place of reaction mixture was also carried out (Vb).

Normality of NaOH = 0.5N

V1 = Volume of NaOH required for the reaction mixture.

Vb = Volume of NaOH required for 10 ml of distilled water (blank) = 0.2ml V1 – Vb = Actual volume of NaOH required for the reaction mixture Glycerol content in the reaction mixture = $(V1 - Vb) \times 0.5 \times 0.092 \times 26.5$

The product after 8 hours of reaction was analyzed for the glycerol content.

RESULTS AND DISCUSSION

The three level coded values in the Box-Benhen design of experiments used for the optimization of biodiesel from jetropha oil with lipase enzyme are shown in Table 1.

The variables and the yield percentage of the experiments are tabulated in table 2. Fifteen experiments were conducted randomly and not necessarily in the order given in the Table to improve the reliability of the experiments.

Results were subjected to Quantum XL regression analysis for the design of experiments (DOE). The concentration enzyme and the temperature variables showed low p values indicating their strong influence the biodiesel yield. Catalytic on reactions are known to exhibit direct relationship between the concentrations of catalyst and the product. Arrhenius concept also predicts a multifold increase in activity for every centigrade increase in temperature.

But the combined effect of enzymes and temperature possess a maximum point of optimum conversion due to deactivation of the enzyme above a denaturation temperature. Insignificant terms- namely Temperature vs Methanol Pumping Rate and Enzyme concentration vs Enzyme Concentration, having p > 0.1, were removed for optimization. The optimized production conditions and the regression analysis results for the variables are given in the table.3 and 4.

The optimization conditions for the production of biodiesel are envisaged highest enzyme as concentration (300 U/mI). low temperatures (38.5°C) and methanol flow rate (10 ml/h) into the reaction medium. A production experiment at the suggested optimized conditions

was carried out. After an accommodation period of about 30 minutes the yield of the biodiesel rapidly increased and reached a maximum of 41.2% in 16 hours.

CONCLUSION

Jatropha oil was trans-esterified with lipase obtained from an *Aspergillus terrus* strain isolated from sunflower oil stock contaminated soil. A yield of 41.2% was obtained for 225g oil with 40ml methanol pumped at the rate of 10 ml/h at 28.5°C in a continuously stirred round bottom flask at 200rpm with a lipase enzyme catalyst having activity of 300 U/ml. The work shows the possibility of a low energy conversion biodiesel process and also the use of glycerol concentration for the measurement of biodiesel conversion.

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Hautfenne A, Standard methods for the analysis of oils, fats and derivatives, Appl. Chem. (1982) vol.54, no.6, pp.1257—1295.
VARIABLE		Factorial Level Code			
		-1	0	+1	
Code	Item	Factorial level Actual values			
Α	Enzyme Concentration	100	200	300	
В	Temperature (°C)	30	40	50	
С	Methanol Pumping rate	6	8	10	

Table 1.Factor variables and their factorial levels used for the optimization.

Experiment	Variable code		V1	V1 –Vb	Glycerol	
No	Α	В	С	(ml)	(ml)	content
					~ /	(g)
1	+1	+1	0	5.0	4.8	5.85
2	+1	-1	0	5.6	5.4	6.58
3	-1	+1	0	3.9	3.7	4.51
4	-1	-1	0	3.3	3.1	3.78
5	+1	0	+1	7.9	7.7	9.38
6	+1	0	-1	6.4	6.2	7.56
7	-1	0	+1	4.8	4.6	5.61
8	-1	0	-1	4.5	4.3	5.24
9	0	+1	+1	5.4	5.2	6.34
10	0	+1	-1	4.5	4.3	5.24
11	0	-1	+1	5.2	5.0	6.10
12	0	-1	-1	4.3	4.1	5.00
13	0	0	0	5.0	4.8	5.85
14	0	0	0	5.0	4.8	5.85
15	0	0	0	5.1	4.9	5.97

Table 2. Experimental design and glycerol yield

Factors							
Name	Factor	Range		Set point			
		Low	High				
Enzyme Concentration (U/ml)	A	-1	1	1			
Temperature (C)	В	-1	1	-0.150			
Methanol Pumping rate (ml/h)	С	-1	1	1			

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Name	Factor	Coeff	SE	Т	Р	VIF
	Const	6.065	0.164	37.089	0.00 0	
Enzyme Concentration (U/ml)	A	1.279	0.120	10.626	0.00 0	1.0
Temperature (C)	В	0.06	0.120	0.499	0.63 3	1.0
Methanol Pumping rate (ml/h)	С	0.549	0.120	4.56	0.00 3	1.0
Enzyme Concentration (U/ml)*Temperature (C)	AB	-0.365	0.170	-2.145	0.06 9	1.0
Enzyme Concentration (U/ml)*Methanol Pumping rate (ml/h)	AC	0.363	0.170	2.13	0.07 1	1.0
Temperature (C)*Temperature (C)	BB	-1.016	0.177	-5.750	0.00 1	1.005
Methanol Pumping rate (ml/h)*Methanol Pumping rate (ml/h)	CC	0.752	0.177	4.257	0.00 4	1.005
	R ²	0.9659				
	Adj R ²	0.9317				
	Std	0.3404				
	Error					
	F	28.294				
	Sig F	0.0001				
	Flof	33.392				
	Sig FLOF	0.0293				

The contour diagrams of the combined effects are shown in figures 1, 2 and 3.









Fig.3 Enzyme Concentration (U/ml) vs Temperature (C) a) Contour Plot b) Surface Plot

The Relationship between Organizational Climate and Organizational Citizenship Behavior among Employees in Infrastructure University Kuala Lumpur (IUKL), Selangor, Malaysia.

Asokan Vasudevan Infrastructure University Kuala Lumpur, Selangor, Malaysia

Abstract

Malaysia as a country that moves towards new millennium has done improvements in various aspects including education. So, to guarantee the nation's education system, education organizations need to play their roles effectively. It is important for organization especially higher education institutions to provide positive and conducive organizational climate for teaching staff to do their job with quality and effectiveness. The purpose of this study is to examine the organizational climate and its relationship with organizational citizenship among the academic and non-academic staff in Infrastructure University Kuala Lumpur (IUKL), Malaysia. The sample size was 281, and only 170 questionnaires were usable for the study. In order to collect the data needed for the study, questionnaire was used and distributed to the respondents at infrastructure University Kuala Lumpur (IUKL). Collected data were analysed through Statistical Package for Social Sciences" (SPSS version 20). Alpha value was 0.0895, the study found significant relationship between organizational climate and organizational citizenship behavior (r=0.611, p = 0.000). Each dimension was correlated significantly with the level of organization citizenship behavior. The level of organizational climate in Infrastructure University Kuala Lumpur can be categorized as high but it still needs to be given attention by management to be improved and increased in order to maintain the level. The study recommends that the management of Infrastructure University Kuala Lumpur (IUKL) to be more sensitive to the needs of organizational climate that is conducive and comfortable, especially those involving reward dimensions, standard dimensions, performance standards and responsibility dimensions. It can be concluded that the level of Organizational Climate among members of Infrastructure University Kuala Lumpur is in very weak condition where the strength is only r = 0.611 event though the relationship is significant. Probably this is because the environmental conditions that is not so satisfactory.

Keywords: Organizational climate, Organizational citizenship behavior

Real-time credit card fraud detection using streaming analytics

U. Rajeshwari MTech CSE, SIT Tumkur rajeshwari0011@gmail.com

Abstract

With the growing popularity of internet, everything is available at our doorstep and convenience. The rapid increase in e-commerce applications has resulted in the increased usage of credit card for offline and online payments. Though there are various benefits of using credit cards such as convenience, instant cash, but when it comes to security credit card holders, banks and the merchants are affected when the card is being stolen, lost or misused without the knowledge of the cardholder (Fraud activity).

Streaming analytics is a time based processing of data and it is used to enable near real-time decision making by inspecting, correlating and analyzing the data even as it is streaming into applications and database from a myriad different sources. We are making use of streaming analytics to detect and prevent the credit card fraud. Rather than singling out specific transactions, our solution analyses the historical transaction data to build a model that can detect fraudulent patterns. This model is then used to analyze financial transactions in real-time.

Hidden Markov model is used to build the model to detect the fraudulent activity. Kmeans clustering algorithm is used to generate the observation symbols which includes the spending behavior, purchase location, date and time of purchase. The outcome of the clustering algorithm is fed as input to the trained HMM. Where each individual user has a HMM trained with Baum Welch algorithm to capture the cardholder's behavior. The new transaction is compared with the base sequence and it is determined to be fraud if the percentage change in probability is above the threshold.

Apache Storm will process the transaction data in real-time and the Hidden Markov model determines the fraud in the incoming transaction. Streaming analytics not only prevents fraud but also reduces the false alarm rate by analyzing the connection between transactions that are suspected fraud and the actual fraud. Our model is first customized to the cardholder's data and then updated periodically to cover new fraud patterns. © Multidisciplinary International Academic Research Conference February 2016, Page no.134

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Review of consumer behavior towards organic food products in Bangalore City

Dr.Madhavaiah. C. MBA., M.Phil., Ph.D., Assistant Professor, Department of Management, Pondicherry University, Karaikal Campus, Nehru Nagar, KARAIKAL - 609 605 Mobile: 089037 65947, E-mail:<u>drcmadhavaiah@gmail.com</u> Shashikiran.L* MBA, UGC NET. (Ph.D), Doctoral Research Scholar , Department of Management, Pondicherry University Karaikal Campus, Nehru Nagar, KARAIKAL - 609 605 Mobile: 9742822000, Email: shashikiranl@gmail.com °Corresponding Author

Abstract

This paper intends to research the measurements important to customers in India connected with their pre purchase evaluation of organic food products. Information was gathered in Bangalore City at various Organic food stores located across city. A Total of hundred and sixty paper-based responses were received. The results of this study uncovered that Indian customers' buying behavior towards organic food product is affected by the factors like: Organic product related, Certification & other regulatory factors, and their attitude (variety seeking and self-indulgence). Further, these factors had andirect & indirect effect on the while they search, purchase & consume organic food products.

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Impact of Sovereign Gold bonds in India Sovereign Gold Bonds

Ganesh Sengottaiyan

Abstract

SGBs are government securities denominated in grams of gold. They are substitutes for holding physical gold. Investors have to pay the issue price in cash and the bonds will be redeemed in cash on maturity. The Bond is issued by Reserve Bank on behalf of Government of India. With one gram of gold pegged at \notin 2,481 (16 Jan 2016) for bonds, paper gold comes with a lock-in period of eight years, for which the government will be compensating at a fixed rate of 2.75% per annum payable semi-annually on the initial value of investment. From tax perspective, the interest on Gold Bonds is taxable as per the provision of Income Tax Act, 1961 (43 of 1961). The scheme also attracts capital gains tax which remains the same as in case of physical gold and it will be technically easy to liquidate on exchanges.

With all these benefits considered, Government's gold bond scheme had received only 8 crore in the first week. Hence the purpose of my study is to understand the reasons as of why an individual lacks confidence or is unwilling to invest in gold bonds.

Enhancement in the heat transfer using Al₂O₃ Nanofluid in double pipe helical coil heat exchanger at different concentrations.

Sancheti Santosh D.ª Department of Mechanical Engineering, PRIST University, 613403, India.

P.R. Suresh ^b Centre for research and development, PRIST University, 613403, India.

Abstract

This paper reports on the experimental study on the flow characteristics and the forced convective heat transfer of a nanofluid consisting of water as a base fluid and different volume concentrations of Al₂O₃ nanofluid (0.25–2) %. Nanofluids are potential coolants, which can provide excellent thermal performance in heat exchangers. The Nanofluid is flowing in inner tube of a double pipe helical coil heat exchanger while in annulus cold water is circulated. The experiments were conducted for counter flow arrangement, the range of Reynolds number from 800 to 8,000. The Al₂O₃ nano particles of about 30 nm diameter are used in the experiment. The outcome of this investigation shows that the heat transfer coefficient of nanofluid is marginally higher than the base fluid under similar operating conditions. As mass flow rate increases the heat transfer coefficient of the nanofluid also increases, also the heat transfer coefficient increases with the increase of the volume concentration of the Al₂O₃ nanofluid. While increasing the volume concentration results in an increase in the viscosity of the nanofluid leading to increase in a friction factor. The experimental values of heat transfer coefficient and friction factor are compared with the available literature. The results are presented in the tabular and graphical form. During calculations of experiments uncertainty analysis are also carried out and the experimental error is in the range of ± 9%.

Keywords: Heat transfer, Nano fluid, Nusselt number

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TVPM: Time Variant Pattern Mining Approach for Job Shop Scheduling on Non-Identical Machines

Mrs. S.Kavitha Assistant Professor, Mech Department, Kalasalingam University, Krishnankoil

Abstract

Shop scheduling is an substantial production scheduling problem where the makespan has to be minimized. There exist various solution around this problem but generates static assignment of processes which cannot be adapted for large scale problems. We propose a dynamic multi attribute shop scheduling algorithm using pattern mining approach. With J jobs, with N operations can be scheduled on M machines using pattern set P. The proposed TVPM- approach generates patterns with available operations of jobs on available machines based on time window. The initial pattern is generated based on operation complexity, which is computed using number of operations and time of jobs. From computed patterns set P, a pattern with least makespan will be identified to schedule the jobs. The proposed algorithm could be applied for multi objective shop scheduling and reduces the time complexity of scheduling and produces efficient scheduling.

Index Terms:

Time Orient Approach, Pattern Mining, Identical Machines, Job Shop Scheduling.

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Healthcare Information Exchange through Integrated Healthcare Repository System

Thenmozhi Subramanian Department of Electronics & Communication Engineering, NPR College of Engineering and Technology, Tamil Nadu, then28@gmail.com Gunasekar Thangarasu Department of Computing and Information Technology University Technology Petronas Ipoh, Malaysia gunasekar97@gmail.com Kayalvizhi Subramanian Department of Civil Engineering and Built Environment Linton University College, Negeri Sembilan, Malaysia kayalvizhi@lintongroup.edu.my

Abstract

The health care providers facing a many challenges to connecting clinical management processes to ensure that an effective collaboration and efficient patient care services are in place. The electronic health digital information which is currently available in major public health care providers is only accessible internally. It's unable to access other healthcare providers across the nation. The physician does know the previous history about the patients and also ask the patients to do all the medical check-up again in the new health care providers place. It's time consuming thus, the patients not getting treatment on time and very expensive. To address the research objectives, a series of studies was carried out. The result of this study suggests that efficiency and collaboration are the key dimensions in driving the intention to use an integrated healthcare repository system. With the Health Information Exchange, the health care providers will be able to gain access to shared medical data and facilitating better health care service to the people.

Keywords : Healthcare, Hospital Management system, Repository system

Development Strategies of a National Company in Transnational Oligopolistic Market: The case of Cooperative Pascual

José G. Vargas-Hernández, M.B.A. Ph. D. University Center for Economic and Managerial Sciences, University of Guadalajara Periférico Norte 799, Edif. G. 201-7, Núcleo Universitario Los Belenes Zapopan, Jalisco, 45100, México Tel. 5233 3770 3340 ext. 25685. jvargas2006@gmail.com,jgvh0811@yahoo.com,josevargas@cucea.udg.mx

> Francisco Javier Sahagún Aguilar Maestría en Negocios y Estudios Económicos Universidad de Guadalajara. CUCEA

Abstract

The objective of this paper is to analyze the success reached due to the implementation of the strategies used by Cooperativa Pascual. An analytic approach is used to understand it's most important problematic. After the labor shortcut in 1982 and posterior worker's strike that lasted more than 3 years that lead to the delivery of the company assets to the workers, the firm changed its name from "Pascual S.A." to "Cooperativa Pascual". Despite all this struggles, the company could perform as one of the best firms at national level in the beverage industry. Cooperativa Pascual is an example of strategy application in companies, because it competes with some of the biggest transnational like Coca-Cola, Pepsi, and others.

Keywords: Pascual Cooperative, successful firm, strategy