# INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE, IT & MANAGEMENT



A Monthly Double-Blind Peer Reviewed (Refereed/Juried) Open Access International e-Journal - Included in the International Serial Directories Indexed & Listed at:

Ulrich's Periodicals Directory @, ProQuest, U.S.A., EBSCO Publishing, U.S.A., Cabell's Directories of Publishing Opportunities, U.S.A.

as well as in

Registered & Listed at: Index Copernicus Publishers Panel, Poland

Circulated all over the world & Google has verified that scholars of more than 1500 Cities in 141 countries/territories are visiting our journal on regular basis.

## **CONTENTS**

Sr.	TITLE & NAME OF THE AUTHOR (S)	Page No.			
No. 1.	HIGH PERFORMANCE ORGANIZATION AND ORGANIZATIONAL EFFECTIVENESS IN BAPPEDA (DEVELOPMENT AND PLANNING BOARD).	1			
1.	ACEH- INDONESIA  FIFI YUSMITA & DR. VIMALASANJEEVKUMAR	1			
2.	SOCIAL ENTREPRENEURS IN BANGLADESH DEWAN MAHBOOB HOSSAIN & MOINUL HOSSAIN	7			
3.	IMPACT OF WORKING CAPITAL MANAGEMENT ON FIRM'S PERFORMANCE: EVIDENCES FROM LISTED COMPANIES OF INDIA  DR. AVANISH KUMAR SHUKLA	13			
4.	ENGLISH TEACHERS' EMOTIONAL INTELLIGENCE AND ITS IMPACT ON THEIR ORGANIZATIONAL CITIZENSHIP BEHAVIOUR IN SRI LANKAN SCHOOLS  U.W.M.R. SAMPATH KAPPAGODA				
5.	A QUALITATIVE INQUIRY OF LEADERSHIP PRACTICES AND ITS BEHAVIORAL AND PSYCHOLOGICAL OUTCOMES  MADIHAREHMANFAROOQUI				
6.	LINKING ORGANIZATIONAL CULTURE, STRUCTURE, AND ORGANIZATIONAL EFFECTIVENESS  FAKHRADDIN MAROOFI, AFSHINGHASEMI & SAMIRA DHGHANI	29			
7.	SWOT ANALYSIS: AN INSTRUMENT FOR STRATEGIC PLANNING – A CASE STUDY  GOMATESH M. RAVANAVAR & DR. POORNIMA M. CHARANTIMATH	35			
8.	THE ROLE OF HRM PRACTICES IN ORGANIZED RETAILING A STUDY OF SELECT RETAILERS IN BANGALORE CITY  LAKSHMI NARAYANA.K, DR. P. PARAMASHIVAIAH & DR. SREENIVAS. D. L	41			
9.	WATER CRISIS AT COAL CAPITAL OF INDIA: A PRAGMATIC STUDY OF ROOT CAUSES, IMPACT AND SOLUTION OF WATER CRISIS IN REGIONS OF WORKING COAL MINES OF BHARAT COKING COAL LIMITED DHANBAD	46			
10.	ABHINAV KUMAR SHRIVASTAVA & DR. N. C. PAHARIYA  PORTFOLIO MANAGEMENT OF INDIAN MUTUAL FUNDS: A STUDY ON DIVERSIFIED EQUITY FUNDS PERFORMANCE  E. UMA REDDY & C. MADHUSUDANA REDDY	50			
11.	A STUDY OF DIFFERENCES IN PERCEPTION OF EMPLOYEES ABOUT THE HRD CLIMATE PREVAILS IN THE ENGINEERING INSTITUTE ON THE BASIS OF AGE GROUP  MUKESH KUMAR PARASHAR & DR. MURLIDHAR PANGA	54			
12.	INSTITUTIONAL FINANCING OF AGRICULTURE IN INDIA WITH SPECIAL REFERENCE TO COMMERCIAL BANKS: PROBLEMS FACED BY FARMERS – AN EMPIRICAL STUDY  DR. KEWAL KUMAR & ATUL GAMBHIR	58			
13.	MULTIPLE FACETS OF ORGAN TRANSPLANTATION IN A TERTIARY CARE HOSPITAL MANAGEMENT, INDIA  DR. PRAKASH.K.N, DR. CYNTHIA MENEZES, DR. ANNAPURNA RAMESH & S. HARISH BABU	61			
14.	FDI, TRADE, AND ECONOMIC GROWTH IN SINGAPOREEVIDENCE FROM TIME-SERIES CAUSALITY ANALYSES  DR. G. JAYACHANDRAN	66			
<b>15</b> .	AN EVALUATION OF MICRO CREDIT IMPACT ON RURAL POOR WOMEN – A CASE STUDY IN BELLARY DISTRICT, KARNATAKA K. S. PRAKASHA RAO	77			
16.	APPRECIATION AND APPREHENSIONS OF INDIAN CORPORATE SECTOR ABOUT CORPORATE SOCIAL RESPONSIBILITY  DR. B. M. HARSHAVARDHAN, DR. A. PRASAD & A V LAL	84			
17.	SOCIAL MEDIA MARKETING: THE NEXT FRONTIER (AN EXPLORATORY STUDY ON SOCIAL MEDIA MARKETING PROSPECTIVE WITH REFERENCE TO PUNE CITY)  GUNJIN SINGH	92			
18.	ROLE OF INFORMATION TECHNOLOGY IN AGRICULTURE AND AGRO-BASED INDUSTRIES  DR. B. RAMACHNADRA REDDY. E. LAVANYA & P. HUSSAIN BASHA	97			
19.	ADVENTURE TOURISM POTENTIAL: A STUDY OF KASHMIR  FARHAT BANO BEG & DR. ASHOK AIMA	99			
20.	INVENTORY MODEL IN A FUZZY ENVIRONMENT WITH ITS ASSOCIATED COSTS IN EXPONENTIAL MEMBERSHIP FUNCTIONS K. PUNNIAKRISHNAN & K. KADAMBAVANAM	102			
21.	EMPLOYEES PERSPECTIVE VIEW TOWARDS PERFORMANCE APPRAISAL AND TRAINING PROGRAMMES PRACTICED IN SUGAR INDUSTRIES IN ERODE DISTRICT  M. SELVI SRIDEVI & DR. L. MANIVANNAN	107			
22.	INTEREST IN MANAGEMENT EDUCATION: THE CURRENT TREND AND ITS IMPLICATIONS  VIJENDRA KUMAR S. K. & ANCY MATHEW	116			
23.	IMPACT OF CORPORATE GOVERNANCE PRACTICES ON THE FIRM PERFORMANCE: AN EMPIRICAL EVIDENCE OF THE SMALL AND MEDIUM ENTERPRISES IN INDIA  PARTHA SARATHI PATTNAYAK & DR. PRIYA RANJAN DASH	119			
24.	A REVIEW OF HUMAN ERROR IN MAINTENANCE AND SAFETY  ROSHAN KURUVILA	124			
25.	SEARCH-EXPERIENCE FRAMEWORK: A CASE OF MOVIE INDUSTRY  T. SAI VIJAY & TANUSHREE GOSWAMI	127			
26.	GENDER EQUALITY AND INCLUSIVE GROWTH: IN CASE OF PUNJAB  DR. SANGEETA NAGAICH & PREETI SHARMA	132			
27.	ESTIMATION OF POPULATION MEAN USING RANKED SET SAMPLING  DR. SUNIL KUMAR, DR. SANDEEP BHOUGAL & RAHUL KUMAR SHARMA & DR. KULDIP RAJ	139			
28.	A GOAL PROGRAMMING FORMULATION IN NUTRIENT MANAGEMENT OF FERTILIZERS USED FOR RUBBER PLANTATION IN TRIPURA  NABENDU SEN & MANISH NANDI	142			
<b>29</b> .	A STUDY ON THE FACTORS INFLUENCING INDIVIDUAL INVESTOR BEHAVIOR IN IT SECTOR  SINDU KOPPA & SHALINI .P	145			
30.	RELIGION, LAW & THE ROLE OF STATE  NITUJA KUMARI & MOHD YASIN WANI	150			
	REQUEST FOR FEEDBACK	154			

## CHIEF PATRON

#### PROF. K. K. AGGARWAL

Chancellor, Lingaya's University, Delhi Founder Vice-Chancellor, Guru Gobind Singh Indraprastha University, Delhi Ex. Pro Vice-Chancellor, Guru Jambheshwar University, Hisar

## FOUNDER PATRON

#### LATE SH. RAM BHAJAN AGGARWAL

Former State Minister for Home & Tourism, Government of Haryana Former Vice-President, Dadri Education Society, Charkhi Dadri Former President, Chinar Syntex Ltd. (Textile Mills), Bhiwani

## CO-ORDINATOR

#### **AMITA**

Faculty, Government M. S., Mohali

## ADVISORS

#### DR. PRIYA RANJAN TRIVEDI

Chancellor, The Global Open University, Nagaland

PROF. M. S. SENAM RAJU

Director A. C. D., School of Management Studies, I.G.N.O.U., New Delhi

PROF. M. N. SHARMA

Chairman, M.B.A., Haryana College of Technology & Management, Kaithal

PROF. S. L. MAHANDRU

Principal (Retd.), Maharaja Agrasen College, Jagadhri

## **EDITOR**

PROF. R. K. SHARMA

Professor, Bharti Vidyapeeth University Institute of Management & Research, New Delhi

## CO-EDITOR

#### DR. BHAVET

Faculty, M. M. Institute of Management, Maharishi Markandeshwar University, Mullana, Ambala, Haryana

## EDITORIAL ADVISORY BOARD

#### DR. RAJESH MODI

Faculty, Yanbu Industrial College, Kingdom of Saudi Arabia

#### **PROF. SANJIV MITTAL**

University School of Management Studies, Guru Gobind Singh I. P. University, Delh

**PROF. ANIL K. SAINI** 

Chairperson (CRC), Guru Gobind Singh I. P. University, Delhi

**DR. SAMBHAVNA** 

Faculty, I.I.T.M., Delhi

#### DR. MOHENDER KUMAR GUPTA

Associate Professor, P. J. L. N. Government College, Faridabad

#### **DR. SHIVAKUMAR DEENE**

Asst. Professor, Dept. of Commerce, School of Business Studies, Central University of Karnataka, Gulbarga **MOHITA** 

Faculty, Yamuna Institute of Engineering & Technology, Village Gadholi, P. O. Gadhola, Yamunanagar

## ASSOCIATE EDITORS

#### PROF. NAWAB ALI KHAN

Department of Commerce, Aligarh Muslim University, Aligarh, U.P.

#### **PROF. ABHAY BANSAL**

Head, Department of Information Technology, Amity School of Engineering & Technology, Amity University, Noida

#### **PROF. A. SURYANARAYANA**

Department of Business Management, Osmania University, Hyderabad

#### DR. SAMBHAV GARG

Faculty, M. M. Institute of Management, Maharishi Markandeshwar University, Mullana, Ambala, Haryana

#### **PROF. V. SELVAM**

SSL, VIT University, Vellore

#### DR. PARDEEP AHLAWAT

Associate Professor, Institute of Management Studies & Research, Maharshi Dayanand University, Rohtak

#### DR. S. TABASSUM SULTANA

Associate Professor, Department of Business Management, Matrusri Institute of P.G. Studies, Hyderabad **SURJEET SINGH** 

Asst. Professor, Department of Computer Science, G. M. N. (P.G.) College, Ambala Cantt.

## TECHNICAL ADVISOR

Faculty, Government H. S., Mohali

#### **MOHITA**

Faculty, Yamuna Institute of Engineering & Technology, Village Gadholi, P. O. Gadhola, Yamunanagar

## FINANCIAL ADVISORS

#### **DICKIN GOYAL**

Advocate & Tax Adviser, Panchkula

#### **NEENA**

Investment Consultant, Chambaghat, Solan, Himachal Pradesh

## LEGAL ADVISORS

Advocate, Punjab & Haryana High Court, Chandigarh U.T.

#### **CHANDER BHUSHAN SHARMA**

Advocate & Consultant, District Courts, Yamunanagar at Jagadhri

## SUPERINTENDENT

3.

## **CALL FOR MANUSCRIPTS**

We invite unpublished novel, original, empirical and high quality research work pertaining to recent developments & practices in the area of Computer, Business, Finance, Marketing, Human Resource Management, General Management, Banking, Insurance, Corporate Governance and emerging paradigms in allied subjects like Accounting Education; Accounting Information Systems; Accounting Theory & Practice; Auditing; Behavioral Accounting; Behavioral Economics; Corporate Finance; Cost Accounting; Econometrics; Economic Development; Economic History; Financial Institutions & Markets; Financial Services; Fiscal Policy; Government & Non Profit Accounting; Industrial Organization; International Economics & Trade; International Finance; Macro Economics; Micro Economics; Monetary Policy; Portfolio & Security Analysis; Public Policy Economics; Real Estate; Regional Economics; Tax Accounting; Advertising & Promotion Management; Business Education; Management Information Systems (MIS); Business Law, Public Responsibility & Ethics; Communication; Direct Marketing; E-Commerce; Global Business; Health Care Administration; Labor Relations & Human Resource Management; Marketing Research; Marketing Theory & Applications; Non-Profit Organizations; Office Administration/Management; Operations Research/Statistics; Organizational Behavior & Theory; Organizational Development; Production/Operations; Public Administration; Purchasing/Materials Management; Retailing; Sales/Selling; Services; Small Business Entrepreneurship; Strategic Management Policy; Technology/Innovation; Tourism, Hospitality & Leisure; Transportation/Physical Distribution; Algorithms; Artificial Intelligence; Compilers & Translation; Computer Aided Design (CAD); Computer Aided Manufacturing; Computer Graphics; Computer Organization & Architecture; Database Structures & Systems; Digital Logic; Discrete Structures; Internet; Management Information Systems; Modeling & Simulation; Multimedia; Neural Systems/Neural Networks; Numerical Analysis/Scientific Computing; Object Oriented Programming; Operating Systems; Programming Languages; Robotics; Symbolic & Formal Logic and Web Design. The above mentioned tracks are only indicative, and not exhaustive.

Anybody can submit the soft copy of his/her manuscript **anytime** in M.S. Word format after preparing the same as per our submission guidelines duly available on our website under the heading guidelines for submission, at the email address: <a href="mailto:infoijrcm@gmail.com">infoijrcm@gmail.com</a>.

## GUIDELINES FOR SUBMISSION OF MANUSCRIPT

	OVERING LETTER FOR SUBMISSION:						
THE EDITOR URCM							
Sul	ubject: SUBMISSION OF MANUSCRIPT IN THE AREA OF .						
( <u>e</u> .	.g. Finance/Marketing/HRM/General Management/Economics/Psychology/Law/Computer/IT/Engineering/Mathematics/other, please specify)						
DE.	AR SIR/MADAM						
Ple	ease find my submission of manuscript entitled '	' for possible publication in your journals.					
	ereby affirm that the contents of this manuscript are original. Furthermore, it has neither been published elsewhere in any language fully or partly, nor is der review for publication elsewhere.						
l af	firm that all the author (s) have seen and agreed to the submitted version of the manuscript and their inclusion of name (s) as co-author (s).						
	to, if my/our manuscript is accepted, I/We agree to comply with the formalities as given on the website of the journal & you are free to publish on on the website of the journals.						
COI							
NA	AME OF CORRESPONDING AUTHOR:						
<b>NA</b> De:	AME OF CORRESPONDING AUTHOR:						
NA De:	AME OF CORRESPONDING AUTHOR:						
NA De: Aff	AME OF CORRESPONDING AUTHOR: esignation: filiation with full address, contact numbers & Pin Code:						
NA De: Aff Re: Mc	AME OF CORRESPONDING AUTHOR: esignation: filiation with full address, contact numbers & Pin Code: esidential address with Pin Code: obile Number (s): ndline Number (s):	7770					
NA De: Aff Res Mc Lar E-n	AME OF CORRESPONDING AUTHOR: esignation: filiation with full address, contact numbers & Pin Code: esidential address with Pin Code: esidential address with Pin Code: esidential Rumber (s): mail Address:	TYN.					
NA De: Aff Res Mc Lar E-n	AME OF CORRESPONDING AUTHOR: esignation: filiation with full address, contact numbers & Pin Code: esidential address with Pin Code: obile Number (s): ndline Number (s):	771					
NA De: Aff Res Mc Lar E-m	AME OF CORRESPONDING AUTHOR: esignation: filiation with full address, contact numbers & Pin Code: sidential address with Pin Code: obile Number (s): maline Number (s): mail Address: ternate E-mail Address:	77					
NA De: Aff Res Mc Lar E-m	AME OF CORRESPONDING AUTHOR: esignation: filiation with full address, contact numbers & Pin Code: sidential address with Pin Code: obile Number (s): maline Number (s): mail Address: ternate E-mail Address:  DTES: The whole manuscript is required to be in ONE MS WORD FILE only (pdf.	version is liable to be rejected without any consideration), which will start from					
NA Des Aff Res Mo Lar E-n Alt NO a)	AME OF CORRESPONDING AUTHOR: esignation: filiation with full address, contact numbers & Pin Code: sidential address with Pin Code: obile Number (s): ndline Number (s): mail Address: ternate E-mail Address:  OTES: The whole manuscript is required to be in ONE MS WORD FILE only (pdf. the covering letter, inside the manuscript.	The state of the s					
NA Des Aff Res Mo Lar E-n Alt	AME OF CORRESPONDING AUTHOR: esignation: filiation with full address, contact numbers & Pin Code: sidential address with Pin Code: obile Number (s): ndline Number (s): mail Address: ternate E-mail Address:  OTES: The whole manuscript is required to be in ONE MS WORD FILE only (pdf. the covering letter, inside the manuscript. The sender is required to mention the following in the SUBJECT COLUMN	of the mail:					
NA Des Aff Res Mo Lar E-n Alt NO a)	AME OF CORRESPONDING AUTHOR: esignation: filiation with full address, contact numbers & Pin Code: sidential address with Pin Code: obile Number (s): ndline Number (s): mail Address: ternate E-mail Address:  OTES: The whole manuscript is required to be in ONE MS WORD FILE only (pdf. the covering letter, inside the manuscript.						
NA Des Aff Res Mo Lar E-n Alt NO a)	AME OF CORRESPONDING AUTHOR: esignation: filiation with full address, contact numbers & Pin Code: esidential address with Pin Code: obile Number (s): mail Address: ternate E-mail Address:  The whole manuscript is required to be in ONE MS WORD FILE only (pdf. the covering letter, inside the manuscript. The sender is required to mention the following in the SUBJECT COLUMN New Manuscript for Review in the area of (Finance/Marketing/HRM/Gen	of the mail: eral Management/Economics/Psychology/Law/Computer/IT/					
NAADee Afff Res Mc Larr E-n Alt NO a) b)	AME OF CORRESPONDING AUTHOR: esignation: filiation with full address, contact numbers & Pin Code: sidential address with Pin Code: obile Number (s): mail Address: ternate E-mail Address:  DTES:  The whole manuscript is required to be in ONE MS WORD FILE only (pdf. the covering letter, inside the manuscript. The sender is required to mention the following in the SUBJECT COLUMN New Manuscript for Review in the area of (Finance/Marketing/HRM/Gen Engineering/Mathematics/other, please specify) There is no need to give any text in the body of mail, except the cases whe The total size of the file containing the manuscript is required to be below	of the mail: eral Management/Economics/Psychology/Law/Computer/IT/ ere the author wishes to give any specific message w.r.t. to the manuscript. 500 KB.					
NA Des Aff Res Mc Lar E-n Alt NC a) b)	AME OF CORRESPONDING AUTHOR: esignation: filiation with full address, contact numbers & Pin Code: sidential address with Pin Code: obile Number (s): mail Address: ternate E-mail Address:  OTES:  The whole manuscript is required to be in ONE MS WORD FILE only (pdf. the covering letter, inside the manuscript. The sender is required to mention the following in the SUBJECT COLUMN New Manuscript for Review in the area of (Finance/Marketing/HRM/Gen Engineering/Mathematics/other, please specify) There is no need to give any text in the body of mail, except the cases whe The total size of the file containing the manuscript is required to be below Abstract alone will not be considered for review, and the author is require	of the mail: eral Management/Economics/Psychology/Law/Computer/IT/ ere the author wishes to give any specific message w.r.t. to the manuscript. 500 KB.					

AUTHOR NAME (S) & AFFILIATIONS: The author (s) full name, designation, affiliation (s), address, mobile/landline numbers, and email/alternate email

ABSTRACT: Abstract should be in fully italicized text, not exceeding 250 words. The abstract must be informative and explain the background, aims, methods,

MANUSCRIPT TITLE: The title of the paper should be in a 12 point Calibri Font. It should be bold typed, centered and fully capitalised.

address should be in italic & 11-point Calibri Font. It must be centered underneath the title.

results & conclusion in a single para. Abbreviations must be mentioned in full.

- 5. **KEYWORDS**: Abstract must be followed by a list of keywords, subject to the maximum of five. These should be arranged in alphabetic order separated by commas and full stops at the end.
- 6. MANUSCRIPT: Manuscript must be in <u>BRITISH ENGLISH</u> prepared on a standard A4 size <u>PORTRAIT SETTING PAPER</u>. It must be prepared on a single space and single column with 1" margin set for top, bottom, left and right. It should be typed in 8 point Calibri Font with page numbers at the bottom and centre of every page. It should be free from grammatical, spelling and punctuation errors and must be thoroughly edited.
- 7. **HEADINGS**: All the headings should be in a 10 point Calibri Font. These must be bold-faced, aligned left and fully capitalised. Leave a blank line before each heading.
- 8. **SUB-HEADINGS**: All the sub-headings should be in a 8 point Calibri Font. These must be bold-faced, aligned left and fully capitalised.
- 9. MAIN TEXT: The main text should follow the following sequence:

INTRODUCTION

**REVIEW OF LITERATURE** 

**NEED/IMPORTANCE OF THE STUDY** 

STATEMENT OF THE PROBLEM

**OBJECTIVES** 

**HYPOTHESES** 

RESEARCH METHODOLOGY

**RESULTS & DISCUSSION** 

**FINDINGS** 

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

SCOPE FOR FURTHER RESEARCH

**ACKNOWLEDGMENTS** 

REFERENCES

APPENDIX/ANNEXURE

It should be in a 8 point Calibri Font, single spaced and justified. The manuscript should preferably not exceed 5000 WORDS.

- 10. **FIGURES & TABLES**: These should be simple, crystal clear, centered, separately numbered & self explained, and **titles must be above the table/figure**. Sources of data should be mentioned below the table/figure. It should be ensured that the tables/figures are referred to from the main text.
- 11. **EQUATIONS**: These should be consecutively numbered in parentheses, horizontally centered with equation number placed at the right.
- 12. **REFERENCES**: The list of all references should be alphabetically arranged. The author (s) should mention only the actually utilised references in the preparation of manuscript and they are supposed to follow **Harvard Style of Referencing**. The author (s) are supposed to follow the references as per the following:
- All works cited in the text (including sources for tables and figures) should be listed alphabetically.
- Use (ed.) for one editor, and (ed.s) for multiple editors.
- When listing two or more works by one author, use --- (20xx), such as after Kohl (1997), use --- (2001), etc, in chronologically ascending order.
- Indicate (opening and closing) page numbers for articles in journals and for chapters in books.
- The title of books and journals should be in italics. Double quotation marks are used for titles of journal articles, book chapters, dissertations, reports, working
  papers, unpublished material, etc.
- For titles in a language other than English, provide an English translation in parentheses.
- The location of endnotes within the text should be indicated by superscript numbers.

#### PLEASE USE THE FOLLOWING FOR STYLE AND PUNCTUATION IN REFERENCES:

#### BOOKS

- Bowersox, Donald J., Closs, David J., (1996), "Logistical Management." Tata McGraw, Hill, New Delhi.
- Hunker, H.L. and A.J. Wright (1963), "Factors of Industrial Location in Ohio" Ohio State University, Nigeria.

#### **CONTRIBUTIONS TO BOOKS**

Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

#### JOURNAL AND OTHER ARTICLES

Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

#### CONFERENCE PAPERS

• Garg, Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

#### UNPUBLISHED DISSERTATIONS AND THESES

Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

### ONLINE RESOURCES

Always indicate the date that the source was accessed, as online resources are frequently updated or removed.

### WEBSITES

• Garg, Bhavet (2011): Towards a New Natural Gas Policy, Political Weekly, Viewed on January 01, 2012 http://epw.in/user/viewabstract.jsp

## A GOAL PROGRAMMING FORMULATION IN NUTRIENT MANAGEMENT OF FERTILIZERS USED FOR RUBBER PLANTATION IN TRIPURA

NABENDU SEN
ASST. PROFESSOR
DEPARTMENT OF MATHEMATICS
ASSAM UNIVERSITY
SILCHAR

MANISH NANDI
RESEARCH SCHOLAR
DEPARTMENT OF MATHEMATICS
ASSAM UNIVERSITY
SILCHAR

#### **ABSTRACT**

Natural rubber is the dominant cash crop of Tripura. Proper nitrogen, phosphorus and potassium applications to the soil are necessary to increase the production of latex and improve the Socio-economic position of the planters. Application of nutrients to the soil is commonly done by using fertilizers. In this paper, a goal programming model is formulated for nutrient management by determining the optimum fertilizer combination for rubber plantation in Tripura.

#### **KFYWORDS**

Linear goal programming, fertilizer combination, priority level, optimization.

#### **INTRODUCTION**

ost of the soil in the North Eastern region are highly degenerated due to shifting cultivation and heavy nutrient removed by thatch grass. In general, available phosphorus and potassium levels are low but the available magnesium is high. Based on this, a separate Fertilizer recommendation with slightly higher levels of N (nitrogen), P (phosphorus) and K (potassium) was formulated for the main field in the North Eastern region where the state Tripura belongs. Healthy rubber tree growth requires continuous supply of all essential nutrients from soil. Under the agro-climatic conditions, rubber plants after planting takes about seven years to attain tappability in most cases. The fertilizer requirements of rubber during the period of immaturity depend to a great extent on the cultivation practices, such as mulching the plant bases during the initial years and the establishment and maintenance of leguminous ground covers in the field. These cultivation practices will result in the improvement of the soil conditions and availability of plant nutrients, particularly nitrogen. The general fertilizer recommendation for rubber is based on the results of the fertilizer experiments conducted by the Rubber Research Institute of India on rubber of different age groups.

It is clear that planning rubber trees has widespread benefits. Rubber based agro-forestry involves a complex and diverse cropping system that combines the growing of rubber and other agricultural crops in the area in a sustainable manner. The rubber tree Hevea-Braziliens's was first introduced as a crop for plantation agriculture many years ago from the wilderness of the amazan jungles.

Application of N-P-K higher than the required level are likely to cause diverse effects on plants and result in a substantial decrease in their yields. Hence, for sustainable production of latex, it is necessary to produce optimum fertilizer combination for nutrient application to the soil. By doing so, damage to the soil's health is minimized. This results in increased production of latex and as a result, improves the economic position of the planters. There may be several objectives in nutrient management and thereby optimum fertilizer combination problems. Basic objective is achievement of nutrient requirements and minimization of cost.

The goal programming (GP) technique in solving agro-forestry management problems involving multiple objectives has become a widely used approach in Operation Research studies (Romero, 1986). The increasing popularity of GP and usefulness for decision-making policies has been aimed at optimizing agricultural land and other natural resources. GP technique can be used to address the problem of determining an optimum-cropping pattern by considering several goals in agricultural planning and management. Wheeler and Russell (1977) used a GP model to analyze the plantation of a farm in the United Kingdom. Ghosh (1993, 1995) presented a model for the allocation of land under cultivation for production of crops in different seasons in a year. Ghosh, Sharma and Mattison (2005) used a model for nutrient management for rice production. Also several studies have been used in natural resources planning (Romero, 1986), livestock ration formulation (Rehman and Romero, 1984, 1987), sugar beet fertilizer combination problems (Minguez, 1988).

In this paper, a priority based linear goal programming technique has been used to obtain the nutrient requirement for rubber plantation by determining the optimum fertilizer combination.

#### **MODEL FORMULATION**

and

```
w_{ij}^-, w_{ij}^+, d_{ij}^-, d_{ij}^+, d_i^-, d_i^+, X \ge 0,
for i= 1,2,....,m; j= 1,2,....,J,
```

where  $f_i(X)$ , i=1,2,...,m, is the ith function (linear) of decision vector X,  $b_i$  is the aspiration level of the ith goal,  $P_j(j=1,2,...,l)$ ;  $J \le m$ ) is the jth priority factor assigned to the set of goals that are grouped together in the problem formulation,  $d_i^-$ ,  $d_i^+$  are the under and over-deviational variables corresponding to the ith goal,  $w_{ij}^-$  and  $w_{ij}^+$  are the numerical weights associated with the under and over-deviational variables  $d_{ij}^-$  and  $d_{ij}^+$  at the priority level  $P_j$ . Here,  $d_{ij}^-$  and  $d_{ij}^+$  are renamed for the actual deviational variables  $d_i^-$  and  $d_i^+$ , respectively.

To formulate the model for the problem, the model variables, constants and coefficients are defined as follows.

Decision variables:

 $x_{in}$  = Amount of fertilizers (n= 1,2,...,N) in the mixture and i= 1,2,...,7(year)

Coefficients and constants:

 $C_{in}$  = unit cost for fertilizers  $x_{in}$  (n= 1,2,...,N) in the mixture and i= 1,2,...,7(year)

 $A_{in}^{(q)}$  = unit amount of nutrient, q(q= 1,2,..,Q) in fertilizer  $x_{in}$ 

 $L_i^{(q)}$  = Minimum limit of nutrient, q(q= 1,2,..,Q)

 $U_i^{(q)}$  = Maximum limit of nutrient, q(q=1,2,..,Q)

T<sub>i</sub> = Total cost of fertilizer

Goal constraints:

#### (1) Total cost:

To avoid any types of unwanted expenditure, there should be an estimated fertilizer cost (T<sub>i</sub>) for a year. The goal equation can be presented as

N

$$\sum C_{in} x_{in} + d_{i1}^{-} - d_{i1}^{+} = T_{i}$$
,  $I = 1, 2, ..., 7$ 

n=1

#### (2) Minimum limit of nutrient:

To ensure a good yield from rubber plant, there should be, at least, a minimum amount of nutrient in the fertilizer combination. The goal equation can be presented as

N 
$$\sum_{i} A_{in}^{(q)} x_{in} + d_{i(q+1)}^{-} - d_{i(q+1)}^{+} = L_{i}^{(q)}$$
,  $i = 1,2,...,7$  and  $q = 1,2,...,Q$   $n=1$ 

#### (3) Maximum limit of nutrient:

To avoid any excess application of nutrient in the fertilizer combination, there should be a maximum limit for each nutrient in the combination. The goal equation can be presented as

$$\sum_{i} A_{in}^{(q)} x_{in} + d_{i(Q+q+1)}^{-} - d_{i(Q+q+1)}^{+} = U_{i}^{(q)}, i=1,2,...,7 \text{ and } q=1,2,....,Q$$
 n=1

#### Application:

Our fertilizer combination plan for rubber plant is for the North-Eastern state Tripura, India. Basically, four types of fertilizers are applied in soil. The fertilizers are Urea, Ammonium Phosphate (AP), Rock Phosphate (RP) and Muriate of Potash (MOP).

**TABLE 1: DATA DEFINITION** 

Variable		Ammonium Phosphate(AP)	Rock Phosphate(RP)	Muriate of Potash(MOP)
	Urea			
Year(i)				
1	X <sub>11</sub>	X <sub>12</sub>	X <sub>13</sub>	X <sub>14</sub>
2	X <sub>21</sub>	X <sub>22</sub>	X <sub>23</sub>	X <sub>24</sub>
3	X <sub>31</sub>	X <sub>32</sub>	X <sub>33</sub>	X <sub>34</sub>
4	X <sub>41</sub>	X <sub>42</sub>	X <sub>43</sub>	X <sub>44</sub>
5	X <sub>51</sub>	X <sub>52</sub>	X <sub>53</sub>	X <sub>54</sub>
6	X <sub>61</sub>	X <sub>62</sub>	X <sub>63</sub>	X <sub>64</sub>
7	X71	X72	X <sub>73</sub>	X74

#### Goal constraints

Total cost:

$$\begin{split} & \underbrace{\sum C_{in} x_{in} + d_{i1}^- - d_{i1}^+ = T_i}_{\text{c}}, I = 1, 2, ..., 7 \\ & n = 1 \\ & \text{i.e. } C_{11} x_{11} + C_{12} x_{12} + C_{13} x_{13} + C_{14} x_{14} + d_{11}^- - d_{11}^+ = T_1 \\ & C_{21} x_{21} + C_{22} x_{22} + C_{23} x_{23} + C_{24} x_{24} + d_{21}^- - d_{21}^+ = T_2 \end{split}$$

$$C_{71}X_{71} + C_{72}X_{72} + C_{73}X_{73} + C_{74}X_{74} + d_{71}^{-} - d_{71}^{+} = T_{7}$$

Minimum limit of nutrients:

$$\begin{split} &\sum_{n=1}^{N} A_{in}^{(nit)} x_{in} + d_{i2}^{-} - d_{i2}^{+} = L_{i}^{(nit)}, \ i = 1,2,.....,7. \ \text{(Nitrogen)} \\ &4 \\ &\sum_{n=1}^{N} A_{in}^{(pho)} x_{in} + d_{i3}^{-} - d_{i3}^{+} = L_{i}^{(pho)}, \ i = 1,2,.....,7. \ \text{(Phosphorus)} \\ &1 \\ &4 \\ &\sum_{n=1}^{N} A_{in}^{(pot)} x_{in} + d_{i4}^{-} - d_{i4}^{+} = L_{i}^{(pot)}, \ i = 1,2,.....,7. \ \text{(Potassium)} \\ &n = 1 \end{split}$$

Maximum limit of nutrients:

4 
$$\sum A_{in}^{(nit)} x_{in} + d_{i5}^{-} - d_{i5}^{+} = L_{i}^{(nit)}$$
,  $i = 1, 2, ...., 7$ . (Nitrogen) n=1

```
 \begin{array}{l} \sum\limits_{} A_{in}^{(pho)} x_{in} + d_{i6}^{\phantom{i}-} - d_{i6}^{\phantom{i}+} = L_{i}^{(pho)}, \ i=1,2,.....,7. \ \ (Phosphorus) \\ n=1 \\ 4 \\ \sum\limits_{} A_{in}^{(pot)} x_{in} + d_{i7}^{\phantom{i}-} - d_{i7}^{\phantom{i}+} = L_{i}^{(pot)}, \ i=1,2,.....,7. \ \ \ (Potassium) \\ n=1 \end{array}
```

Priority level:

As per the decision-making environment, priority level of the problem can be defined as follows:

$$\begin{split} &P_{1}. \text{ Minimize } (d_{i2}^- + d_{i3}^- + d_{i4}^-) \\ &P_{2}. \text{ Minimize } (d_{i1}^+ d_{i5}^+ + d_{i6}^+ + d_{i7}^+) \\ &\text{Therefore achievement function is} \\ &\text{Minimize } Z = P_1(d_{i2}^- + d_{i3}^- + d_{i4}^-) + P_2(d_{i1}^+ + d_{i5}^+ + d_{i6}^+ + d_{i7}^+) \end{split}$$

#### **SOLUTION OF THE FORMULATED MODEL**

In this paper, we have formulated the model for the period of seven years when matured rubber tree will produce latex. On the basis of available previous data, the developed model can be tested. Solution may be achieved by manual calculation. But manual calculation is time consuming process and not so easy. So the use of software like LINGO, Excel-Solver will be more easy.

#### CONCLUSION

In this paper, the methodology (Goal Programming) for optimum fertilizer combination is an alternative to the traditional optimization technique based linear Programming. It may be useful for agro-forestry planners who can guide the planters for fertilizer combinations. In this paper, we attempt to deal with the nutrient management problem using Goal Programming technique. Our study can be applied to other sectors also having the similar environmental constraints. For different climatic conditions, some practical aspects may be included in the model.

#### **REFERENCES**

- 1. Atis, E., Nurlu, E. and Kenaroglu, Z.(2005). Economic and Ecological Factors Affecting Sustainable Use of Agricultural Land and Optimal Sustainable Farm Plans: The Case of Menemen, Pakistan Journal of Biological Sciences, Vol.8, No.1, pp. 54-60.
- Diaz-Balterio, L. and Romero, C. (1998). Modeling Timber Harvest Scheduling Problems With Multiple Criteria: An Application In Spain, Forest Science, 44, pp. 47-57.
- 3. Field, David B. (1973). Goal Programming for Forest Management, Forest Science, Vol. 19, No. 2, pp. 125-135.
- 4. Ghosh, D., Sharma, D.K. and Mattison, D.M. (2005). Goal programming formulation in nutrient management for rice production in West Bengal, International Journal of Production Economics, 95, pp. 1-7.
- 5. Ignizio, J.P. (1976). Goal Programming and Extensions, Lexington, MA: Lexington Books.
- 6. Jafari, H., Koshteli, Q.R. and Khabiri, B. (2008). An Optimal Model Using Goal Programming For Rice Farm, Applied Mathematical Science, Vol.2, No.23, pp. 1131-1136.
- 7. Kwak, N.K. and Schniederjans, M.J. (1985). A Goal Programming Model as an Aid in Facility Location Analysis, compute & Opt. Res. Vol.12, No.2, pp. 151-161.
- 8. Misir, N. and Misir, M. (2007). Developing A Multi-Objective Forest Planning Process With Goal Programming: A Case Study, Pakistan Journal of Biological Sciences, Vol.10, No.3, pp. 514-522.
- 9. Nja, M.E. and Udofia, G.A. (2009). Formulation of the Mixed-Integer Goal Programming Model for Flour Producing Companies, Asian Journal of Mathematics and Statistics, Vol.2, No.3, pp. 55-64.
- 10. Pal, B.B. and Basu, I. (1996). Selection of Appropriate Priority Structure for Optimal Land Allocation In Agricultural Planning Through Goal Programming, Indian Journal of Agricultural Economics, 51, pp. 342-354.
- 11. Pongthanapanich, T. (2003). Review of Mathematical Programming for Coastal Land Use Optimization.
- 12. Rustagi, K. (1973). Forest Management Planning for Timber Production: A Goal Programming Approach, Yale Unvi.
- 13. Sen, C. (1983). A New Approach for Multi-Objective Rural Development Planning, The Indian Economy Journal, Vol.30, No.4.
- 14. Tamiz, M., Jones, D. and Romero, C. (1998). Goal Programming for Decision Making: An overview of the current state-of-the art, Europe Journal of Operation Research, 111, pp. 569-581.



## REQUEST FOR FEEDBACK

#### **Dear Readers**

At the very outset, International Journal of Research in Commerce, IT and Management (IJRCM) acknowledges & appreciates your efforts in showing interest in our present issue under your kind perusal.

I would like to request you to supply your critical comments and suggestions about the material published in this issue as well as on the journal as a whole, on our E-mail i.e. infoijrcm@gmail.com for further improvements in the interest of research.

If you have any queries please feel free to contact us on our E-mail infoijrcm@gmail.com.

I am sure that your feedback and deliberations would make future issues better – a result of our joint effort.

Looking forward an appropriate consideration.

With sincere regards

Thanking you profoundly

**Academically yours** 

Sd/-

Co-ordinator

## **ABOUT THE JOURNAL**

In this age of Commerce, Economics, Computer, I.T. & Management and cut throat competition, a group of intellectuals felt the need to have some platform, where young and budding managers and academicians could express their views and discuss the problems among their peers. This journal was conceived with this noble intention in view. This journal has been introduced to give an opportunity for expressing refined and innovative ideas in this field. It is our humble endeavour to provide a springboard to the upcoming specialists and give a chance to know about the latest in the sphere of research and knowledge. We have taken a small step and we hope that with the active cooperation of like-minded scholars, we shall be able to serve the society with our humble efforts.

# Our Other Fournals





