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Invited Talks
Special Presentations
Abstracts & Full Papers

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Confederation of Indian Universities (CIU), New Delhi, India
Diplomatic Research & Policy Foundation (DRPF), Macedonia
International Benevolent Research Foundation (IBRF), India
International Institute of Management (IIM), Australia
PREFACE

Dear Associates

Welcome to each and every one of you congregated for the prestigious IMRF’s 92nd International Gathering - Proceedings of the International Multidisciplinary Research Conference Thailand 2018 at Asian Institute of Technology Conference Center, Bangkok Thailand organized by International Multidisciplinary Research Foundation (IMRF), Thailand Chapter which is considered to be one of the premier events for the distinguished academic and research cult with the encouragement of Confederation of Indian Universities (CIU), New Delhi, India; Diplomatic Research & Policy Foundation (DRPF), Macedonia ; International Benevolent Research Foundation (IBRF) , India ; International Institute of Management (IIM), Australia.

We know that an academic conference is a symposium for inventive academicians and imaginative researchers to give academics an opportunity to present their academic works, concepts and new discoveries and to exchange their ideas and develop their works and also to share idea in presenting for development in the new research and topics and so forth. Together with academic or scientific journals, conferences plausibly provide a central channel for exchange of information among earnest researchers.

IMRF with its Academic Chapters in many Countries, since inception, has a great academic, research and social priorities to promote the spirit of values and orientations in multidisciplinary research functions of education by working out in dexterity required by the integrity of a sophisticated social world order duly transmitting central heritage with scientific bent of mind forming socialization process in respect of reformation of attitudes to confer a serene status for a rational being called man on this civilized planet, of course, from the threshold of Ratna Prasad Multidisciplinary Research and Educational Society.

IMRF has left no stone unturned for the accomplishment of its vision and mission catering its influential services in the academic and research disciplines comprising the streams of Human Rights, Social Sciences, Arts and Education, English Studies, Business Sciences, Engineering Sciences, Mathematical Sciences, Life Sciences, organizing International Conferences humbly witnessing the virtuous presence and innovative presentations of investigating pioneers, potential leaders, promising researchers, intellectual academicians, working faculty, industry magnates, advanced educationists, eminent scientists, rational thinkers, earnest scholars and superior students with their bonafide work of discovery from as many as 50 and more countries in the world (with their recurring presence) including home towards showcasing their professional performance with excellent communication skills based on their accumulated experience in the fields concerned successfully.

Globalization is a fact. Its internalization process integrates multidisciplinary fields to embark on an adventure in the realm of academics and research. As such, this conference by International Multidisciplinary Research Foundation (IMRF). I am pleased to unveil the fact that this Copy of Proceedings marked with ISBN No 978-93-86435-60-6 presents an educative network of research with strength of quality, originality and contribution to knowledge of significant fields of multidisciplinary realms duly identified by the solemn research portals and academic destinations in the world.

While presenting you with this sonata of latest academics and research findings, I humbly place on record my loyal acknowledgement of sincere appreciation, due recognition and heart-felt thanks to all intellectual paper presenters, article contributors, members on the esteemed Editorial Board, centres of higher learning in collaboration with IMRF, foreign-national delegates, erudite plenary speakers, scholarly participants and all those who are directly or indirectly in conformity with this IMRF conferences from home and abroad for their righteous everlasting support in one and all aspects and my sincere thanks to Asian Institute of Technology, Bangkok, Thailand for their ever dynamic support and cooperation. Gratitude is attitude!

With effusive thanks,

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LITERATURE, EDUCATION, 
WOMEN STUDIES & 
SOCIAL SCIENCES
UTILIZATION OF ONLINE LEARNING TOOL TO CALIBRATE COMMUNICATIVE COMPETENCE OF EFL LEARNERS

ROMMEL V. TABULA

Abstract: Previous studies highlighted the impacts of technology-mediated environments to language learning and teaching. The Rajamangala University of Technology Lanna, after having developed technology-based software to build confidence and improve communication skills of the students, carried out the Phase II of its English Development Program project to test its validity. This quasi-experimental research was undertaken to investigate the effectiveness of EngWow as an alternative online learning resource in empowering the communicative competence of language learners in an EFL classroom. Within a period of three months, data were collected from an intact class of 41 students specializing in Engineering-related courses. The participants were subjected to undergo 10 lessons from the EngWow. Through teacher-made Communicative Competence Test, a pretest and a posttest were administered, and a semi-structured open-ended questionnaire was utilized to validate the quantitative data. Mean and t-test were employed in the treatment of data. Results yielded significant improvement in the communicative competence of the students after having exposed to EngWow. Qualitatively, findings revealed that students favor EngWow due to flexibility of time, accessibility to technology and internet, self-paced learning and researching, face to face interaction, and comfortable environment. Thus, EngWow connives with foregoing researches that technological development is very significant and effective in learning a foreign language.

Keywords: Communicative Competence, EFL Learners, English Proficiency, Engwow, Online Learning Tool, Technology.
BRIDGING SCIENCE FICTION AND DETECTIVE NARRATIVE:
AN ANALYSIS OF JAPANESE MASH-UP

DR. ABDUL MOHAMMED ALI JINNAH

Abstract: Amongst the pop-cultural genres, the concept of mash-up, dealing with the amalgamation of certain mainstream works of art and lowbrow literature has become the vogue of twenty-first century literature. The heterocosmic theory propounded by Brian McHale in postmodernist fiction and the concept of chrono-synclastic infundibulum are used to create an alternate universe theory and in the fabrication of multiple universes (multiverses). Detective fiction that operates on the ground of logic and skepticism is inverted in postmodern mystery; and science fiction, a genre that locates itself in the liminal space between fiction and reality are perfectly brought together by numerous Japanese writers in the construction of the mash up narrative. The paper would focus on the mash-up between detective and science fiction that has been created by Japanese writers Haruki Murakami, Ryu Murakami and Banana Yoshimoto among others. The researcher would concentrate on various tenets that define the mash-up and provide a transrealistic reading of the selected novels.

Keywords: Heterocosm, Transrealism, Japanese Fiction.

***

Dr. Abdul Mohammed Ali Jinnah
Associate Professor of English, Jamal Mohamed College
(Affiliated to Bharatidasan University), Trichy, Tamil Nadu
abdul.m.jinnah@gmail.com
SUICIDE AS VENGEANCE: A READING OF FEMINIST CHARACTERS IN CONTEMPORARY ANTI-DETECTIVE FICTION

R. LAKSHMI PRIYA

Abstract: Suicide which is often interpreted as a sign of weakness and frailty has become synonymous with the characterisation of women. Jocasta, is given the honour of being the first character to commit suicide in literature; unfortunately she also happens to be a woman. There are numerous literary examples of women committing self-immolation as an inevitable measure which leads to the idea that the writers have symbolised them as pathetic figures, irrespective of time and age. There was Ophelia in Hamlet, followed by Anna Karenina, Emma Bovary in Flaubert’s Madame Bovary, Edna Pontellier in The Awakening and Eustacia in The Return of the Native who committed mélange, among many other. The act of Felo de Se, which raises the question was the person who committed the felon really responsible for it? Especially in these cases, which involve a woman? Is committing suicide a representation of inescapability? What if there is a reversal of role in terms of victim, despite the act of suicide? Is it committed really as Queen Gertrude states, “Incapable of her own distress”? What if the act itself transgresses from being self-immolation to an act of vengeance and revenge. This paper could focus on various literary suicides committed by women characters till the twentieth century and the reversal of role from the contemporary times pertaining primarily to the novels, The Drivers Seat by Muriel Spark, Death in a Delphi Seminar by Norman N. Holland and The Blind Assassin by Margaret Atwood.

Keywords: Suicide Literature, Inversion, Anti - Detective Fiction.

***

R. Lakshmi Priya
Research Scholar, Department of English, Bishop Heber College
Affiliated to Bharatidasan University, Trichy, Tamil Nadu
tharikapriya@gmail.com
‘THE CENTRALITY OF OPPOSITION AS THE DEFINING CATEGORY OF SELFHOOD’: A STUDY OF JANE EYRE

ISRAT JAHAN NIMNI

Abstract: In her first published novel, *Jane Eyre* (1847) Charlotte Brontë portrays Jane, the protagonist, as a struggling spirit who is plain and simple in appearance but intellectual and courageous in nature. Examining the narrative structure of the novel, one can see that each household in which Jane finds herself is under the regulation of a dominant male master, who is surrounded by a group of dependant women. Each of the male character tries to chain her in a bond of slavery. While one wants to enslave her in passion, the other wants to imprison her in principle. This paper is an attempt to show that the male characters in the novel function as the catalysts for discovering Jane’s selfhood, her self-potentiality, and achieving her liberty. The opposing forces, unconsciously, work as the driving force for attaining Jane the status of the hero in the novel. The novel is a journey from darkness to light, from imprisonment to freedom.

***

Israt Jahan Nimni
Department of English Language and Literature,
Noakhali Science and Technology University,
Sonapur, Noakhali 3814, Bangladesh
SOCIAL INTERACTION ANXIETY AND ACADEMIC ADJUSTMENT AMONG FRESHMEN COLLEGE STUDENTS

ACHMAD SHOLEH, SAKINAH, HASNA ALFIANI FADHILA
BRAMANTIO A. NUGRAHA, NUR WIDIASMARA

Abstract: This study presents to investigate the relationship between social interaction anxiety and academic adjustments among freshman college students. This study used a quantitative approach with correlational method. The instruments in this study used Social Interaction Anxiety Scale (SIAS) which developed by Mattick et al. and Academic Adjustment variable was measured by used Academic Adjustment Scale by Anderson et al. The subjects in this study are 216 freshman college students, consist of 110 men and 106 women. The results were consistent with the study hypotheses, showed that there is a negative relationship between social interaction anxiety and academic adjustment among freshmen college students. The data showed from the value of correlation $r = -0.441$ with significance of $p = 0.00$, $p<0.05$. Based on the result, its concluded that social interaction anxiety has influence academic adjustment among freshman college students.

Keywords: Social Interaction Anxiety, Academic Adjustment, Freshmen.

Achmad Sholeh
Department of Psychology, Universitas Islam Indonesia
Sakinah
Department of Psychology, Universitas Islam Indonesia
Hasna Alfiani Fadhila
Department of Psychology, Universitas Islam Indonesia
Bramantio A. Nugraha
Department of Psychology, Universitas Islam Indonesia
Nur Widiasmara
Department of Psychology, Universitas Islam Indonesia
zholeh.wei@gmail.com; 15320217@students.ii.ac.id
TEACHER SUBJECTIVE WELLBEING AND BURNOUT AMONG TEACHERS IN YOGYAKARTA

FARHAN AL-FARIZI, WULANNING SITI MUTHIA
AHMAD ZAIN FAHMI, NUR WIDIASMARA

Abstract: Based on the theory developed from research conducted by Leiter and Maslach and Marzano and Hellebower in Jacobson (2016), a teacher’s self-welfare can be a factor that causes burnout in teachers with indicators having isolated feelings, lack of support from coworkers and administrators, class management problems, and how much the possibility of career improvement will be obtained. This study aims to determine the relationship between burnout and subjective well-being of teachers in Yogyakarta. The number of subjects in this study were 119 teachers in Yogyakarta. Data collection methods are carried out using work Maslach Inventory Burnout scale and Teacher Subjective Wellbeing scale. The results of this study indicate a significant negative relationship between burnout and teacher subjective well-being with \( r = -0.416 \) and \( p = 0.000 \) \((p <0.05)\), so the hypothesis is accepted. Based on these results, it can be concluded that the higher a person’s work fatigue, the lower their subjective well-being will be.

Keywords: Burnout, Teacher Subjective Wellbeing, Teacher in Yogyakarta.

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Farhan Al-Farizi
Fakultas Psikologi dan Ilmu Sosial Budaya Universitas Islam Indonesia Yogyakarta
Wulanning Siti Muthia
Fakultas Psikologi dan Ilmu Sosial Budaya Universitas Islam Indonesia Yogyakarta
Ahmad Zain Fahmi
Fakultas Psikologi dan Ilmu Sosial Budaya Universitas Islam Indonesia Yogyakarta
Email: 15320315@students.uii.ac.id
Nur Widiasmara
Fakultas Psikologi dan Ilmu Sosial Budaya Universitas Islam Indonesia Yogyakarta
DAILY SPIRITUAL EXPERIENCES AND ACADEMIC ADJUSTMENT AMONG FRESHMEN COLLEGE STUDENTS: STUDY IN INDONESIA

HASNA ALFIANI FADHILA, BRAMANTIO A. NUGRAHA, ACHMAD SHOLEH, SAKINAH, NUR WIDIASMARA

Abstract: This study aimed to determine the relationship between daily spiritual experiences and academic adjustments among freshman college students. This study used a quantitative approach with correlational. Measurement of daily spiritual experiences was done by using Daily Spiritual Experiences Scale (DSES) which developed by Underwood et al. and Academic Adjustment variable was measured by using Academic Adjustment Scale by Anderson et al. The subjects in this study are 216 freshmen college student, consist of 110 men and 106 women. The data analysis showed that correlation value of $r = 0.442$ with significance of $p = 0.00$, $p<0.05$. The results were consistent with the study hypotheses, showed that there is a positive relationship between daily spiritual experience and academic adjustment among freshmen college students. Based on the result, its concluded that daily spiritual experience has influence academic adjustment among freshman college students. The explanations will be report in this study.

Keyword: Daily Spiritual Experience, Academic Adjustment, Freshmen College Student.

Hasna Alfi an Fadhila 
Student of Department Psychology, Universitas Islam Indonesia 
Bramantio A. Nugraha 
Student of Department Psychology, Universitas Islam Indonesia 
Email: 15320084@students.uii.ac.id 
Achmad Sholeh 
Student of Department Psychology, Universitas Islam Indonesia 
Sakinah 
Student of Department Psychology, Universitas Islam Indonesia 
Nur Widi asmara 
Lecturer of Department Psychology, Universitas Islam Indonesia
Abstract: This study was aimed to determine the relationship between Social Support and Problem Solving among teachers in Yogyakarta. The subjects of the study were 106 teachers in Yogyakarta, which consist of teachers in public schools, private schools and inclusive schools. The scale used Personal Problem-Solving Inventory and Multidimensional Scale of Perceived Social Support. Statistical results used the Spearman Rho technique showed that there was a significant positive relationship between problem solving and social support \((p = 0.000, r = 0.401)\). The relationship between the two variables showed that the higher the Social Support shown by teachers in Yogyakarta Indonesia, the higher the Problem Solving of their life.

Keywords: Social Support, Problem Solving, Teacher.

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Muhamad Taufik Hermansyah,
Student in Universitas Islam Indonesia
Musdalifah,
Student in Universitas Islam Indonesia
Muhammad Garlianka Wangsadikrama
Student in Universitas Islam Indonesia
Nur Widiasmara
Lecturer in Universitas Islam Indonesia
GRATITUDE AND TEACHER SUBJECTIVE WELL-BEING AMONG TEACHER IN YOGYAKARTA

WULANNING SITI MUTHIA, AHMAD ZAIN FAHMI FARHAN AL-FARIZI, NUR WIDIASMARA

Abstract: Teacher's subjective well-being has a big impact on the aspects of life and also the teaching process conducted in school. Hence, in the term of fulfilling these things and to get subjective well-being, a stance is needed as the consequence to always feel grateful for any situations which happened. This study aims to determine the relationship between the gratitude and subjective well-being of teachers in Yogyakarta. The number of respondents in this study was 119 teachers in Yogyakarta. The research sampling technique was convenience sampling. This study uses quantitative methods. The data collection methods were carried out using a questionnaire consisting of 2 scales, namely the Gratitude Questionnaire scale 6 (GQ6) and the Teacher Subjective Well-being Scale (TSWQ). The results of this study indicate that there was a positive correlation between gratitude and the teacher’s well-being with a coefficient of 0.340 and \( p = 0.000 \) (\( p < 0.05 \)), the hypothesis is accepted. Based on these results, the conclusion is the subjective well-being can be determined by the teacher’s level of gratitude. Teacher's Subjective well-being can be seen through the intensity and frequency of the teacher’s gratitude.

Keywords: Gratitude, Teacher Subjective Well-Being, Teacher in Yogyakarta.

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Wulanning Siti Muthia
Student, Department of Psychology,
Universitas Islam Indonesia, Yogyakarta, Indonesia
Email: 15320330@students.uii.ac.id

Ahmad Zain Fahmi
Student, Department of Psychology,
Universitas Islam Indonesia, Yogyakarta, Indonesia

Farhan Al-Farizi
Student, Department of Psychology,
Universitas Islam Indonesia, Yogyakarta, Indonesia

Nur Widiasmara
Lecture, Department of Psychology,
Universitas Islam Indonesia, Yogyakarta, Indonesia
EVALUATED PROPOSED WORK TEXT IN FILIPINO SUBJECT FOR GRADE 11 BASED ON K-12 CURRICULUM

JOSEPH P. DE REAL

Abstract: Students and teachers are partners in the field of education. Students cannot gain different knowledge if there's no teacher who will guide them. In the hands of a teacher, choosing the appropriate strategies and approaches in teaching can determine the success of acquiring the outcome knowledge of the students. Therefore, instructional materials in teaching have big impact in the process of learning. It helps the students to learn fast and easy to understand the lesson because of these materials in teaching instruction.

The implementing of the new curriculum K-12 in the Philippines has huge adjustments and needs of the teachers teaching in Senior High School especially in the public schools of using instructional materials in Filipino subject for Grade 11. The proposed work text in Filipino subject for Grade 11 is matched for the evaluation of the experts as additional learning materials in Filipino subject.

For the development of any educational program, it needs unity and cooperation of the teachers, parents, administrators of the schools and curriculum experts who contributed to show the insufficient and lacking of the schools to provide learning instructions to address the needs of the students.

The proposed work text as an instructional material is highly recommended for teachers who are teaching language especially in Filipino subject and teacher who are teaching Filipino in Senior High School for Grade 11. This study will served as guide and reference in order to improved and gave importance in teaching and studying language and Filipino subject.

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Joseph P. De Real
Bilingual Education,
Doctor in Philosophy, New Era University
IN PURSUIT OF A BETTER FUTURE:
UNDERSTANDING ASPIRATIONS OF PARTICIPANTS OF ADDITIONAL SKILL ACQUISITION PROGRAMME, KERALA, INDIA

MARIA MATHEW

Abstract: In postcolonial India, Akhil Gupta (1998) observes through his research on farmers in Rampur, that the self-awareness of “backwardness” is a critical part of the experience of modernity. In Kerala, the experience of “backwardness” in the postcolonial moment is tied to the state’s former glory in the world of development through “Kerala Model of Development”. Priya Ram, who is the District Programme Manager of Additional Skill Acquisition Programme [ASAP] in Malappuram, Kerala, while expressing the need for a programme like ASAP said in a rather pensive mood, “There was a time when we were world-famous for our human resources and our development. You know, there used to be this joke...even if you go to the moon, you will find a malayalee doing business there. But now....we are so ill-prepared to provide skilled labour force to the service industry”.

The following excerpt from the foreword of the magazine called ‘SUCCESS: Strengthening Curriculum by Embedding Skill sets’ released by ASAP secretariat, states the ‘conundrum’ as well as its solution in no uncertain terms.

In the wake of the changing job-market scenario, better level of skill sets are becoming a desirable trait in increasing your chances of being hired. From the employer’s perspective, the current theory-based curriculum and academic structures alone are not the sufficient criteria to make candidates eligible for selection. Although practical training along with the regular academic courses assist your career growth, communication skills, IT skills and related industry skills are necessary to survive in the present-day job market. Ironically, Kerala has been going through a crisis in the realm of our educated youth. Despite having academic qualifications, lack of employability skills makes our youth ill-equipped for jobs. This conundrum could turn our demographic dividend into a demographic disaster.

In the current competition scenario, availability of skilled manpower is a prerequisite to catalyse the industrial growth also. To enhance the employability of our population, we need to develop an education culture coupled with skill enhancement, effective training and multi-skilling; It’s a need of this hour to create a dynamic education system benchmarked against the best countries in the world. An approach that would inculcate certain core competencies and skills to the learner can make a sea change in the industry.

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Maria Mathew
PhD Candidate,
Graduate Institute of International and Development Studies,
Geneva
IRISH POET J.C. MANGAN’S VIEWS ON THE EAST WITHIN THE FRAME OF THE ORIENTAL RENAISSANCE

NURTEN BIRLIK, ARDA ARIKAN

Abstract: Irish poet J.C. Mangan (1803-1849) wrote poetry about the Orient in a non-Orientalist mode of thinking. His ideas about the non-West make more sense if we locate him in the Oriental Renaissance movement of his time. This counter movement which critiqued the givenness of modernity and the way the East was represented in the West underlined the operating mechanisms of the Enlightenment ideology which defined for the Easterners what/who they were. In this mode of thinking, although Mangan acknowledged the flaws of the Eastern epistemologies, he placed the East on an equal footing with the West. In his prose work, he went so far as to say that “the Mind… looks rather Eastward than Northward.” Interestingly enough, he also poeticised his views about the Orient, a case in point is Suleiman, who appears as the source of solution to the impasse of the West in his “The Time of the Roses.” This paper will give an overview of his ideas on the East offering a close reading of three of his articles on Turkish Poetry and his poem “The Time of the Roses,” and argue that Mangan establishes an alternative vantage point to approach the East, which is almost untainted by the ills of the West and the hierarchies established by the Eurocentric gaze.

Keywords: J. C. Mangan, Oriental Renaissance, “The Time of the Roses,” Irish Poetry.

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Nurten Birlik,
Middle East Technical University, Ankara, Turkey
nbirlik@metu.edu.tr

Arda Arıkan
Akdeniz University, Antalya, Turkey,
ardadari@gmail.com
FATHERING SELF-EFFICACY AND FATHER INVOLVEMENT AMONG WORKING FATHER

NUR WIDIASMARA, AMALINA NUR RAMADHANI

Abstract: This study was aimed to examine the correlation between fathering self-efficacy and father involvement in Yogyakarta, Indonesia. The study involved 100 working fathers aged 26 until 55 year with children aged 1 month until 29 year. This study used quantitative method with Father Involvement Scale adapted from the Inventory of Father Involvement (Hawkins et al, 2002) and Fathering Self-Efficacy Scale adapted from the Parenting Sense of Competence (Johnston & Mash, 1989) as instrument to collected the data. Data analysis used non-parametric statistic Spearman Correlations. The results showed that there was significance correlation between Fathering Self-Efficacy and Father Involvement (r=0.623, p=0.000). Capable of problem solving in the fathering self-efficacy dimension had the highest correlation with time and talking together on the dimension of father involvement (r=0.579, p=0.000). The conclusion of this study is that father involvement can be determined by the existence of fathering self-efficacy. Father’s involvement through the availability of time and talking together with his child can be built with the father’s belief in capable of problem solving. The results of the study are discussed further.

Keywords: Father Involvement, Fathering Self-Efficacy, Working Father.

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Nur Widiasmara,  
Lecturer of Department of Psychology,  
Universitas Islam Indonesia, Indonesia, Main Building UII,  
Gedung Dr. Soekiman Wirjosandjojo, Kampus Terpadu UII,  
Email: nurwidiasmara@ui.ac.id

Amalina Nur Ramadhani,  
Alumni of Department of Psychology,  
Universitas Islam Indonesia, Indonesia
EXPERIENCES OF MAINSTREAMING GENDER STUDIES IN BOTSWANA: SUCCESSES, CHALLENGES AND ALTERNATIVE STRATEGIES

BATSALELWANG K.P.J

Abstract: Botswana’s commitment to gender equality and women empowerment is reflected by its ratification of International agreements and protocols on Gender Equality. With appreciation that Education plays a critical role in human development, Botswana found it fit to mainstream gender into the curriculum. This paper presents the results of a desk study that focused on the experiences of mainstreaming gender in the Basic Education curriculum in Botswana. Document analysis that include; United Nations Development Plan Reports on Gender Equality in Botswana, Botswana National Reports, Vision 2016 and 2036, Curriculum Blueprint and journal articles on gender mainstreaming and other policy documents were primarily used for data collection. The study focused on the following research questions; what strategies were used to mainstream gender in the curriculum, and how effective were the strategies? The results yielded different perspectives that include the successes and challenges experienced in the case of Botswana. In particular, a major milestone was the incorporation of gender issues in the Basic Education curriculum and gender mainstreaming in the development agenda. In spite of this positive effort, inadequate resources such as capacity of teachers to integrate gender into the subject areas, was found as one of the challenges. Informed by this reality, the paper argues for the need to identify alternative strategies for effective training for gender equality. In conclusion, the paper argues that subtle issues of gender inequality require; commitment, a robust gender training and research curriculum, in particular, resources for capacity building gender specialists.

Keywords: Gender Mainstreaming, Integration, Infusion, Education, Capacity Building, Resources, Botswana.

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Batsalelwang K.P.J
University of Botswana
joybatsalelwang@gmail.com
UNDERSTANDING PERCEPTIONS AND LIVED-EXPERIENCES OF LITERATURE TEACHERS IN THE 21ST CENTURY

AISA VERONICA E. DADULLA

Abstract: This phenomenological study investigated the perceptions and lived-experiences of teachers at one public senior high school in light of teaching literature in the 21st century. The aim of this study was to provide overt descriptions on how teachers themselves can recognize coherence in their perceptions and their lived-experiences in teaching literature in the 21st century. Informants’ interview was conducted to answer questions about instructional practices, perception of students’ literacy development, challenges in meeting the demands of 21st century teaching. The resulting data were examined using the inductive content analysis. Results suggest that prior experiences formed the bases for key informant teachers’ perceptions regarding the roles of a teacher, students, teaching methods, teacher-student relationships, and what to teach and achieve in teaching literature in the 21st century. Overall, the results of this inquiry offer empirical bases for planning pedagogical and professional developments of teachers to meet the needs of 21st century learners.

Keywords: Teaching Perceptions, Teaching Literature in the 21st Century, Teachers’ Lived-experiences

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Aisa Veronica E. Dadulla
New Era University, Philippines
THE CRISIS OF THE ARAB INTELLECTUAL
IN THE FACE OF CONTEMPORARY CHALLENGES

PROF.DR. MOHAMMED DAWABSHEH

Abstract: There are a number of queries that will confront anyone who tries to get close to the dialectic of culture and culture and between them, and put behind each "vocabulary" of these words more than question marks, like the intellectual? What is culture? What is the relationship between them? This is in addition to trying to cast these controversies on the reality of the current Arab scene.
The definitions of the word "culture" have reached 164 definitions, as in the "Introduction to Cultural Sociology" of David England and John Huston, which are in their simplest definitions: that they are everywhere around us morally and substantively, customs, traditions, religions, sects, art, architecture, theater, poetry, books and cinema.
The crisis of the Arab intellectual today is a state of great value exposure, in which many of the propagandists and symbols of culture have fallen, whose crises have been revealed by the crisis with the most basic epistemological doctrines and ideological ideas. After the struggle of some of them long, under the banner of strengthening the values of the cultural era, such as democracy and human rights, as it falls in the first real test of his faith in the ideals of his struggles, such as democracy for which he fought for a long time, today he stands against them as long as it did not come by his team of power.
What emerged from the Arab Spring, and appeared in many of its stations in many forms and forms, indicates a real existential cultural crisis, manifested culturally living a social and moral vacuum, fell at the first real test point; for his belief in what he claims and raise slogans that were only empty and Misleading; to market its own distorted interior with its many contradictions.
The research will present many of the crises experienced by the Arab intellectual at present, including: political, religious and social, in addition to intellectual fear and the relationship of literature and women.

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Prof.Dr. Mohammed Dawabsheh,
The Arab American University, Jenin, Palestine
Mohammed.dawabsheh@aaup.edu
Abstract: The Philippines once claimed to be a country with the most English speakers with the exception of the two other countries where the language originated. There was also a time when we were nicknamed as 'the little brown Americans.' The many decades of decline have deteriorated the Filipino's command of the English language which wore away our advantages in the global arena. According to a Philippine contact center insider, a large fraction of Filipino contact center applicants fail to pass the job interview due to low English proficiency. As an English teacher, I find this very alarming. I strongly believe that the failure of my students in the area of English communication is also my failure as a teacher. This issue is prompting me to conduct a research and experiment on my findings to come up with a 21st century literary reading material as a supplemental guide for senior high school language teachers. The guide will serve as reference in encouraging the use of video cameras for self-evaluation and coaching purposes and the use of assessment forms that will aid the teacher in evaluating his/her performance such as:

- Students' evaluation of teacher's classroom performance
- Teaching proficiency report which would update the teacher's progress to target based on students' test scores, class participation and other achievements.
- Peer-to-peer Evaluation. Currently, department heads schedules an evaluation and assess teachers while teaching when they are most ready and at their very best. Peer-to-peer evaluation would not only provide an avenue for evaluation but also for fellow teachers to learn from each other by observing how a teacher performs during class.
- Student's evaluation form. This would aid the students in monitoring their progress in language proficiency. The report will be sectioned with different English proficiency aspects such as tone, prepositions, subject-verb agreement and others. This will help student in understanding his/her strengths and the aspects that he/she needed needs to work on to reach his/her target.

I believe that the result of this research will prove useful in encouraging fresh ideas and strategies in teaching in the 21st century, alleviating students' advantages in landing a career upon graduation, and invigorating English language teaching in the country.

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Joycelyn G. Sy
Master Teacher II, San Francisco Integrated Senior High School
Department of Education, Quezon City, Philippines
EMOTIONAL INTELLIGENCE: 
DEVELOPING TEACHER-STUDENT RELATIONSHIP 
IN OPEN AND DISTANCE LEARNING

DR. PALLAVI SOMAN

Abstract: Teachers are the pillars of education system. Education recognize the importance of the relationships that teachers develop with their students which results in positive academic outcomes. Literature provides evidence that strong relationships between students and their teachers are essential for development of students. It suggest that having a positive relationship with a teacher allows students to be able to work on their own as it gives self-confidence to them even if they are in distance mode. 
Open and distance learning (ODL) in recent times is accepted as an alternative channel to democratize education. A major need in distance education is providing human communication and interaction. Rapidly developing distance learning models have connected student, teachers and students’ emotions. So here we need to focus on the concept of Emotional Intelligence (EI). 
The concept of emotional intelligence means persons have a self-awareness that enables to recognize feelings and manage emotions. Emotionally intelligent teachers have the ability to perceive and regulate their own emotions, which might help to increase students’ engagement where distance is not a barrier. 
The present study focuses developing EI for improving teacher student relation and ability to manage and retain long term relationship which will contribute significantly. The research methodology is mixed method in which survey and interview will be conducted. The tool will be questionnaire. The sample for study is forty distance learners from ODL. The data analysis will help to find the social and emotional relationship between the teachers and students in ODL.

Keywords: Teacher- student relationship, Emotional intelligence, Open and distance learning.

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Dr. Pallavi Soman
Symbiosis Centre for Distance Learning, Pune
pysoman@gmail.com
CUSTOMER RELATIONSHIP DEVELOPMENT THROUGH EMOTIONAL INTELLIGENCE IN OPEN AND DISTANCE LEARNING

DR. NARENDRA P. PARCHURE

Abstract: Customer Relationship Management (CRM) mainly consist of establishing, nurturing, sustaining, and enhancing client relationship which will ultimately lead to maximization of profit and market share of the organization. CRM has emerged as a way of dealing with the challenges. Customer retention is the ability of an organisation to retain its customers for specified period. Emotional Intelligence (EI), is the capability of individuals to recognize their own emotions and emotions of others, distinguish between feelings and name them appropriately, use information to guide thinking, behaviour, and manage emotions to adapt environment for achieving goals. Managing customer relationship is a great challenge in the present era of service revolution. Therefore, managing customer relationship is plays dominant role even for educational institutes. This is also applicable to Open and Distance Learning (ODL) institutes. In distance learning it is difficult to build a rapport with the students, but awareness of emotional intelligence help the institutes to retain relationship. There is a popular belief that higher the emotional intelligence of service provider better will be their ability to manage customer relationship.

The present study focuses on satisfaction of customers by fulfilling their expectations with high level of emotional intelligence and ability to manage and retain long term relationship which will contribute significantly.

The sample for study is fifty distance learners from ODL institutes. The research methodology is survey method using questionnaire as a tool. The data analysis will help to find out the relationship between the distance learners and organisation.

Keywords: Customer relationship, Emotional intelligence, Open and distance learning

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Dr. Narendra P. Parchure,
Symbiosis Centre for Distance Learning, Pune
narendraparchure@gmail.com
EVERYDAY RESISTANCE OF SIDEWALK BOOK VENDORS ALONG CLARO M. RECTO AVENUE OF THE NEOLIBERALLY URBANIZED CITY OF MANILA

REYNOLD D. AGNES, EDWIN S. MARTIN

Abstract: This study focuses on the “everyday resistance” of the sidewalk book vendors along C.M. Recto, Manila. Specifically, (1) it aims to understand the motivation of the book vendors to continue vending along the sidewalks vis-à-vis the prohibition of the city government, (2) the reason why the latter wanted to eradicate them, and (3) the different types and the intentionality of the vendors’ resistance against the authorities. These specific purposes of the study were addressed by analyzing the extracted narratives of the book vendors using interviews and focus group discussion methods of data gathering. The study concludes that the primary motivation of the book vendors to vend along the avenue is for the sustenance of their families, particularly, for the schooling of their children. This motivation is reinforced by the belief that sidewalk vending is a decent job that helps poor students who patronize their products. Analytically, these values expressed by book vendors regarding their work clash with the objective of the government which is to eradicate them in line with the implementation of the ethos neoliberal urbanism. Given this condition, the sidewalk book vendors intentionally employ different strategies of resistance to survive in their trade. This strenuous dynamics between the sidewalk book vendors and the authorities gave birth to an informal structure that helps explain the perpetuation of the prohibited sidewalk vending along C.M. Recto Avenue, Manila.

Keywords: City of Manila, Claro M. Recto, Neoliberal Urbanism, Sidewalk Vending, Everyday Resistance.

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Reynold D. Agnes
The Graduate School, University of Santo Tomas
Far Eastern University, N. Reyes St., Manila, Philippines
Edwin S. Martin,
Ph.D., The Graduate School, University of Santo Tomas
POLICY AWARENESS, AVAILMENT, AND QUALITY OF PRIVILEGES OF PERSONS WITH DISABILITIES IN THE PROVINCE OF ZAMBALES: A BASIS FOR A PROPOSED POLICY ENHANCEMENT

ILDEFONSO RABANG FULGAR III

Abstract: This study assessed the policy awareness, availment, and quality of privileges of persons with disabilities (PWD’s) in the province of Zambales in relation to the implementation of Republic Act No. 7277 as amended, as a basis for a proposed policy enhancement. Descriptive approach in the collection of data was used. The survey questionnaire was utilized as the main data-gathering instrument for the research work.

The main findings of the study are: the PWD-respondents have poor understanding on equal opportunity for employment, auxiliary social services, health services, accessibility and special lanes. They were considerably aware of tax exemptions and special discounts on goods, services, transportation, and enjoyment. The PWD-respondents recognized that they occasionally avail services relevant to health and social services, accessibility, and mobility. Overall, both focal persons and PWD-respondents have the lowest perception of service delivery and improvement than MSWDO heads and CCGR’s.

On the basis of the findings generated from the study, the following conclusions are: awareness of the surveyed PWD’s was based on the efforts of the concerned local government units; the PWD-respondents basically have inadequate knowledge of the privileges; the operations and services of the stakeholders are not adequate to accommodate and serve the beneficiaries. Lastly, it showed a low perception of the PWD-respondents on the role of the service providers and other stakeholders. The following recommended solutions are: sustainable livelihood programs, corrective measures on privileges on discounts, and safeguard the PWD from different forms of prejudice.

Keywords: Persons with Disabilities, PWDs, PWD, Minority Group.

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Ildefonso Rabang Fulgar III
Department of Political Science, Institute of Arts and Sciences,
Far Eastern University-Manila, Philippines
A STUDY ON EFFECT OF SCHEDULED ACTIVITIES ON HYPERACTIVE BEHAVIOR OF CHILDREN AGED 6-9

NIDA KHAN

Abstract: Objectives: Present study made an effort to investigate the effect of scheduled activities on hyperactive behavior of children aged between 6 to 9. Method: After screening, 40 students were identified with hyperactive behavior. The sample was divided into two groups, one controlled group (n=20) and one experimental group (n=20). The tool used for assessment of hyperactive behavior was DSM-IV ADHD Symptom Checklist—Child and Adolescent Version 6177. Data was analyzed by using Mean, Standard deviation and dependent T-test. Result: The finding of the study showed that there was a significant difference between the mean scores of Pre and Post test. Conclusion: It can be concluded that these scheduled activities (skill training) helps to improve the behavior and skills of the children with hyperactivity. Implication: This research can help us in identification of children with hyperactive behavior and also intervention or skill training can be conducted to modify the hyperactive behavior of children.

Keywords: Hyperactivity, Attention Span, ADHD, Impulsivity, Attention Span And Behavioral Therapy.

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Nida Khan
Counselling Psychologist
E.H.I.S Indore
A PRELIMINARY STUDY OF TAEBAEK SANMAEK

KEN’ICHIRO HIGUCHI

Abstract: The South Korean novel Taebaek Sanmaek by Jo Jung-Rae was first published in 1983, and the tenth (and final) volume was published in 1989. The story mainly takes place in the farming area of South Cholla in the southern part of the Korean Peninsula. It describes the modern history of the peninsula, from the time after its liberation from the Japanese rule to the fixation of the division of Korea after the Korean War. This highly-respected novel became a best seller and was made into a feature film in 1994. In addition to the history that is offered, the topics explored in this work are broad and include complex political and ideological arguments. Moreover, there are many characters, and each has a diverse background. Due to this complexity, few academic studies have researched this work. In this presentation, we will reorganize the many story layers and characters in Taebaek Sanmaek as well as the Korean culture that it represents through historic awareness, historic interpretation, and a culture of common people and language. Finally, we will explore the possibility of future academic studies on this novel.

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Ken’ichiro HIGUCHI
Associate Professor, School of Culture-Information Studies
Sugiyama Jogakuen University (SJU)
EXPERIENCING AGGRESSION FROM MENTALLY CHALLENGED CHILDREN: MODERATING ROLE OF EMOTIONAL SUPPORT

ABDULLAH HAFEEZ, SYED HARRIS LAEEQUE

Abstract: This study examined the moderating role of emotional support on the relationship between mentally challenged children's aggression and health and job-related outcomes of teachers. Data was collected over a period of three months from 18 schools that provide education to children with mental disabilities in two metropolitan cities of Pakistan. Results revealed that teachers who experience aggression from mentally challenged children are likely to have health issues, and show reduced engagement and satisfaction with their job. Moreover, emotional support significantly moderates the effects of aggression on health, job engagement and job satisfaction of teachers. It was found that when subjected to aggression, teachers who feel less emotionally supported, report more health issues, and lower job engagement and job satisfaction. To the best of the researchers' knowledge, this study is the first to integrate the literature on intellectual disability with research on social support. It hopes to promote more research so that interventions for dealing with aggression of mentally challenged students can be developed.

Keywords: Aggression, Mental Challenge, Intellectual Disability, Emotional Support, Health, Job-Outcomes, Teachers.

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Abdullah Hafeez
Senior Assistant Professor, Department of Management Sciences,
Bahria University, Islamabad
abdullahhafeez@gmail.com

Syed Harris Laeeque
PhD Scholar, Department of Management Sciences,
Bahria University, Islamabad
‘MAKE-IN-INDIA REVOLUTION’ AND ‘PATANJALI HERBAL’ - A CASE REVIEW OF AN INDIGENOUS ENTREPRENEURSHIP

DR. BEDANTA BORA, DR. ANINDITA ADHIKARY, DR. NEETA DHUSIA SHARMA, DR. AJEYA JHA

Abstract: ‘Make-in-India Revolution’—an indigenous movement launched on September 25th, 2014, is introduced to be a promising initiative taken up by the Government of India. The primary goal of this drive is to portray India as a global manufacturing-cum-investment hub through encouraging both multinational and domestic firms to make their products within geographic boundary of the country. The present Make-in-India campaign permits 100% Foreign Direct Investment (FDI) in more than 20 sectors of the economy. As a result, India received US $60 billion foreign investment in the fiscal 2016-17 and is being emerged as one of the top destinations in global investment map in terms of FDI, surpassing China and the United States of America. Experts perceive ‘Make-in-India’ to be a vibrant launch, and if accurately navigated, would play a pivotal role in growth dynamics of the country.

In view of this revolutionary trend, there appears a phenomenal growth of an Ayurvedic and Herbal giant named ‘Patanjali Ayurved Ltd’ (known as PAL) with a reported revenue of US$ 1.57 billion in the financial year 2017. Couple of years ahead, the PAL plans a transnational presence with a proposed investment of around US$ 800 million with the sole aim of synchronising the art of ‘Veda’ (Ayurveda) with modern ‘Vigyan’ (Science). ‘Patanjali’ as a ‘Swadeshi’ (Indigenous) brand becomes a buzzword now. Indian households have recognized it to a reasonable extent. The blend of Yoga, Pranayam (Meditation) and Ayurveda backed up with a charity thrust by its brand ambassador Baba Ramdev is proved out as a driving force towards its strong positioning amongst the common minds. Currently, PAL has a diversified assortment of near about 400 products being dealt in the market. Herbal Medicines along with Hair Oil, Toothpaste, Soaps, Floor Cleaners, Ghee, Mixtures, and Biscuits are to name a few. Baba Ramdev, as an indigenous entrepreneur, has a transformed business model and opened a fresh herbal era for the public at large. The organic ingredients of the offered products with a ‘Swadeshi Feeling’ are a budding challenge for the multinational firms in the country. Coming to a glance over its early stage reflects that Patanjali Ayurved Ltd. just began with a bare hand. Baba Ramdev was a little known yoga practitioner in a sacred town called Haridwar in Northern India. He, in close association with Acharya Balkrishna ventured into manufacturing herbal medicines in 1990 and set up a pharmaceutical unit called ‘Divya Pharmacy’. Now, more than 98% of PAL’S shares belong to Balkrishna who has a net worth of US$6.1 billion as of March, 2018. Patanjali today, is unquestionably a fastest growing indigenous brand in India with ‘Patanjali Food and Herbal Park’ at Haridwar being the primary production facility. Patanjali dreams to make India self-reliant and attain a complete cultural and economic freedom in years to come. From Natural Health Care to Herbal Home Care—no other indigenous entrepreneurs have been able to create such a huge portfolio in a noticeably short span of time. According to ‘The Brand Trust Report Study India-2018’, Patanjali has been acknowledged as ‘Most Trusted FMCG Brand’ amongst 11,000 brands in the country. With incremental revenue in past few years, the PAL presently has a widespread channel of over 5,000 distributors, 100 mega-marts and 15,000 flagship stores spread over entire India. Meanwhile, the company has made strategic alliances with prominent chains like Reliance Retail, Future Group, Spencer, Star Bazaar in addition with a few e-com portals in India. The newest proposal of ₹1,200 crore production unit in one of the provinces and a plan towards going publicly listed in near future provides with a clue of PAL’s rigorous expansion programme. Patanjali’s positioning as Health Conscious, Pure and Herbal aided by the ‘Make-in-India Perception’, is probably the key driver in the direction of becoming an extraordinary indigenous brand amongst its peers in the country.

Considering this backdrop, the present study aims to weigh up ‘Patanjali’ as a game changing Swadeshi Brand and bring to light a few ground realities that have positioned it as a flourishing entrepreneur. The methodology adopted here is based on the secondary information with a semi-structured primary observation carried out for the purpose. The source of data consists of selected empirical literatures, published periodicals, and more distinctively, the web database. The primary information seems to be restricted and geographic extent of the study is confined to Indian economy as a whole. The research, in a sense, is not carried out on the basis of any pre-determined hypothesis. Rather, an open mind to the possibilities of derived information and outlook of the subject is ensured for conceptualization and
onward re-presentation. Again, as close participants-in-practice, the researchers underwent an on-site interaction with a group of selected consumers. The same made them sense about a changing trend and preferences towards herbal products in the country. Besides, the entire approach under consideration is a case review and a structured SWOT analysis (acronym for Strength, Weakness, Opportunity and Threat) is carried out for the purpose to validate the same. **Findings** infer that the encouragement of Ayurveda blended with a Herbal Era holds out an assured prosperity of healthiness and spiritual well-being of the masses. Further, it is being argued with a firm belief that the instantaneous rise of Patanjali in terms of its Swadeshi Hymn has significantly revolutionized Indian Ayurveda to an observable extent. Branding through Spirituality with a Purity Feel, unique combination of ‘Ved’ and ‘Vigyan’, as if, are the Unique Selling Propositions behind Patanjali’s dramatic victory. It is hoped that an enhanced Herbal Era too, is not far away. Nevertheless, a few significant queries do come out of these reflections; like- will Patanjali be able to sustain its state of affairs in days to come? Or shall it be a momentary occurrence as the case with few others? There may still have a way to go in order to ensure a long term sustainability. For, leading players persistently do keep an eye on Patanjali’s success story and sooner or later coming up with similar business tactics in order to re-position themselves in the market. Hence, while there is a little ambiguity on how long Patanjali Empire remains as a game changer, time will prove. Till then, the authors are in a position to **conclude** that PAL has to be genuinely vigilant in terms of its commitment and momentous fulfilment of the same. Embellishment, at times, might result in lost market share and fail to ensure an unchanged brand loyalty amongst its consumers. For this reason, it is perceived that if Patanjali’s promise towards building a Holy, Healthy and Herbal Lifestyle is not just a mere lip service, it would unquestionably heighten itself in a significant manner. A continual research and innovative endeavour in this regard, would also be a plus in order to proceed an extra mile. As such, this indigenous entrepreneurial spirit must be aligned with India’s advantage in terms of its highly acclaimed ‘Make-in-India Revolution’. The present case, reviews the same at micro level in said direction.

**Keywords:** Make-in-India, Patanjali, Indigenous Perception and Herbal Era.

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Dr. Bedanta Bora  
Department of Management Studies, Sikkim Manipal University  
SMIT Campus, Rangpo, Majitar, East Sikkim-737136, India  
E-mail: bedanta.b@smit.smu.edu.in, Bedantai@yahoo.com  

Dr. Anindita Adhikary  
Department of Management Studies, Sikkim Manipal University  
SMIT Campus, Rangpo, Majitar, East Sikkim-737136, India  

Dr. Neeta Dhusia Sharma  
Department of Management Studies, Sikkim Manipal University  
SMIT Campus, Rangpo, Majitar, East Sikkim-737136, India  

Dr. Ajeya Jha  
Department of Management Studies, Sikkim Manipal University  
SMIT Campus, Rangpo, Majitar, East Sikkim-737136, India
DETERMINANTS OF EQUITY PREMIUM: EVIDENCE FROM EMERGING ECONOMY

BU HE, MUHAMMAD IMRAN

Abstract: Equity premium is one of the vital numbers in finance to be considered for making fund allocation and investment decisions. This study explores the relationship between (controllable) determinants of firm level equity premium in the context of Pakistan stock market. Sample of 306 firms annual data, ranging from 01/2001 to 12/2015 is used. During the selected sample period the average market premium of Pakistan stock exchange (index) is twenty percent. Similarly, the average equity premium of individual firms is only eight percent. Company fundamentals are considered as determinants of firm level equity premium. Panel data econometrics techniques were used to estimate the augmented multifactor model for the first time in Pakistan Stock Exchange. It is found that market premium, return on equity, dividend payout ratio, account receivable and firm size significantly affect the firm level equity premium positively. However, increase in debt to equity and quick ratio negatively affect the firm level equity premium. The company fundamental variables are controllable for the firms which can be improved by the company management to encourage investors and maximize the shareholders wealth.

Key words: Pakistan Stock Exchange, Equity premium, Company Fundamental, Panel Data, Augmented Multifactor Model

JEL Classification: B15, B21, B22, C38, E4, E6, G12.

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Bu He
China Matouqin Symphony Orchestra of Wu Trial, Erdos,
Inner Mongolia, People's Republic of China
Muhammad Imran
School of Finance and Economics, Jiangsu University,
Zhenjiang, People's Republic of China
VALUING INTERNATIONAL ORGANIZATIONS LAW

DR. JAMES D. FRY, DR. NATASHA PUSHKARNA

Abstract: This paper is a response to the lack of rigorous methodological work among the authoritative works on international organizations law. To date, the prevailing view of international organizations has been that they provide a formal channel of interstate cooperation. Since the mid-19th century, international organizations have focused mostly on particular regions or specialized purposes. At the same time, they enshrine several common principles and values, although not as many as the leading scholars of international organizations law would have us believe. The authors of this paper have put these values to the test. Using a database of the founding charters and treaties of 191 international organizations (representing the largest statistical census of these documents to date), the paper empirically assesses whether international organizations – at least on paper – share the same values and principles. Unsurprisingly, the authors found large differences between international organizations. Somewhat surprisingly, regional organizations do not stress cooperation as fervently as their universal cousins. Moreover, organizations formed to uphold peace and security do not differ so much in the principles they espouse as some of the more specialized organizations. This paper reports those findings. This research has been funded by a generous grant from the Research Grant Council of the Hong Kong Special Administrative Region.

We hope to receive a decision on this paper proposal as soon as humanly possible, as we are eager to report this acceptance to the Hong Kong Research Grant Council. Thank you in advance for considering this paper for inclusion in your conference.

Keywords: Constitutions of International Organizations, Comparative Law, Mixed-Methods, Inductive Design.

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Dr. James D. Fry
University of Hong Kong Faculty of Law
Dr. Natasha Pushkarna
University of Hong Kong Faculty of Law
ORGANIZATIONAL COMMITMENT: A REVIEW OF THE CONCEPTUAL AND EMPIRICAL LITERATURE AND A RESEARCH AGENDA

BASEL AL-JABARI, ISSAM GHAZZAWI

Abstract: Although much has been written on the subject of organizational commitment, this article attempts to provide a grounded, yet an exploration of the current conceptual and empirical literature on the subject. Therefore, a primary objective of this research is to investigate theoretical and empirical perspectives that seek to explain organizational commitment with particular attention paid to the foundational research into the factors and dimensions that affect employee retention. In addition to enriching the literature regarding commitment to one's organization, this article provides a road map to guide the future research efforts of scholars and practicing managers through a suggested research agenda.

Keywords: Organizational Commitment, Affective Commitment, Normative Commitment, Continuance Commitment, Attitudinal Commitment, Behavioral Commitment, Exchange Theory Of Employee Commitment, Employee Retention, Side-Bet Commitment, Social Identity Theory.

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Basel AL-Jabari, Ph.D.
Professor of Management
College of Business and Public management
University of La Verne, 1950 Third Street
La Verne, CA 91750

Issam Ghazzawi, Ph.D.
Professor of Management
College of Business and Public management
University of La Verne, 1950 Third Street
La Verne, CA 91750
Abstract: This article presents an approach to brand management through a process of stimulus and organism (i.e. perceptions, image, attitudes, knowledge) formation of brand. The two empirical cases – one of the consumer perceptions on Alipay mobile payment system, and another on Tae-tea brand in China – demonstrate not only the validity and robustness of the SOR (Stimulus-Organism-Response) model but also offer some of the theoretical and practical implications in other research and practical issues and areas. The model fit is evidenced by the structural equation model (SEM) statistics. By integrating the descriptive analysis, ANOVA and t-tests, the various significant differences of the demographics and psychographic variables can further help the brand owners and managers identify the important areas where branding and marketing initiatives should be targeted. The SOR model is simple and analytically generalizable to various applications not limiting to only consumer behaviors and brand perceptions, but can also be extended to any research issues that relate to socio-psychological states, stimulating factors, intentions, commitment, behaviors and performances.

Keywords: Stimulus, Organism, Response, SOR Model, Brand Management.

Introduction: A brand is an identifier for the consumers in helping them to make purchase decisions (Slater, 2012). A strong brand, according to Wheeler (2013), stands out in a densely crowded or cluttered marketplace, and thus, how a brand is perceived by the consumers affects its success. In fact, nothing else offers business leaders so much potential leverage than the power of brand (Wheeler, 2013). This study focuses on how brand can be effectively managed. A concept known in the consumer behavioral research and practices as stimulus-organism-response (SOR) concept is adapted. The SOR concept has been empirically tested by Tan (2017) and Tan (2018a) in tourist behavioral studies as well as for developing the attitudes and social entrepreneurial investments by the communities that aim to improve their qualities of life and to foster a sustainable livelihood security (Tan, 2018b). In recognition of the parsimonious feature of the SOR concept and theoretical framework, this study makes a further attempt to position the SOR concept in the context of brand management directly by use of the existing knowledge of the branding literature rather than those of consumer behaviors. In other words, the research objective is stated as follows:

“The purpose of this study is twofold. First, by use of the existing brand literatures as the deductive base, the stimulus-organism-response (SOR) configuration for use in brand management is articulated. Second, two questionnaire-based surveys, pertaining to the brand perceptions of the consumers of Alipay’s mobile payment services and Tae-tea brand in China, are used to demonstrate the validity of the SOR model based on structural equation modeling (SEM) analysis.

Literature Review: A review of the brand discipline identifies two important concepts, known as the “small b” brand and the “big B” Brand, which could be used as a theoretical base for SOR (stimulus-organism-response) concept development for brand management. While the “small b” brand notion represents the obvious and the easily manifested which focuses on differentiating the offers such as by means of a name and a visual identity (Dall’Olmo Riley, 2010), the “big B” Brand notion sees brand as “complex entities and value systems” (p. xxv) which represents the vision that drives the creation of products and services under that name (Kapferer, 2008, p. 171). In other words, the “big B” forms the core concept of organism in the SOR (stimulus-organism-response) theory of consumer behaviors and reflects the subjective meanings (de Chernatony and Dall’Olmo Riley, 1998), the perceived value of the offers (Tan, 2018a), and the perceptual images and attitudes formed by the consumers toward the offers. The values of the offers could be utilitarian in nature, which may also communicate the embedded cultural or symbolic meaning (McCracken, 1986) that provides primarily symbolic or value-expressive functions to the consumers.
To be effective in brand management, the “small b”, together with other factors such as marketing strategies or destination features (Tan, 2017; 2018), should facilitate the organism formations in terms of “big B”. The “big B” – the organism – thus becomes important ingredients forming parts of the definition of a so-called brand. For instance, in de Chernatony and Dall’Olmo (1998), apart from brand being known through a tangible means such as brand as a legal instrument, a logo, a company, a shorthand, brand is even more so of organism aspects such as brand as a risk reducer, an identity system, an image in consumer’s mind, a value system, a personality and a relationship. The following presents the rational evidences for the SOR model development which is being structured by three hypotheses.

The SOR Model Development: Stimuli can be broadly defined as anything that can help form brand associations or anything linked in memory to a brand (Aaker, 1991). Thus, it can be inferred that an effective stimulus, in general, forms one-of-a-kind-engaging experiences that no other competitors can easily replicate (Wheeler, 2013). Many types of stimuli are possible, namely marketing or brand campaigns in nature (Tan, 2017; 2018), or by means of destination features or through designs of the offers (as advocated in Berlyne’s [1971] theory of optimal arousal view which states the role of design characteristics such as specificity, novelty and complexity in arousing consumer’s motivation and interests). Stimulus could also be needs driven:

- functional needs that relate to solving consumption-related problems (Jaworski and MacInnis, 1986, p. 58),
- symbolic needs that aim for self-enhancement, role position, group membership, or ego-identification (ibid, p. 60), and
- experiential needs that exploit sensory, affective and cognitive stimulations (ibid, p. 60).

In addition, in most instances, consumers are shopping for values (Wheeler, 2013), and thus, stimulus should be strategically linked to value perceptions of consumers. In destination branding, value identification of the offer is often the first stage in the process of building or refreshing any destination brand (Morgan and Pritchard, 2002) and should be integrated to the destination’s identity (Tan, 2018a) as identity provides essential brand meaning and impression (Kapferer, 2008; Tan, 2018a).

For positive impact, the stimuli should lead to create strong brand perception of consumers, as strong brands are thought to have a better memory encoding (Johnson and Russo, 1984) and storage advantage over unknown brands in building awareness and image (Park et al. 1986, p. 108), leading to the following broad-based hypothesis:

H1: The stimuli play the key role in influencing brand organism.

In short, the stimuli stated in H1 is best to take a broader perspective along the concept of Gestalt psychology (Kohler, 1929), which could be cognitive (Tan, 2018a) or sensory (Lindstrom, 2005) in nature, so as to enable the brand management to consider the brand field as a whole in holistic manner (Deighton, 1996), such as considering social media engagement (Tan and Patthracholakorn, 2018). Being Gestalt, there also manifest the interrelationships among the organism factors, such as in between customer values and brand attitudes (Tan, 2018a), leading to the following hypothesis H2:

H2: There are significant interrelationships of the various brand stimuli elements.

To unify the different aspects of the stimuli, Tan (2018) and Wheeler (2013) advocate on the use of brand identity which should best be manifested in every stimulus touchpoint. To Wheeler’s (2013) understanding, brand identity “fuels recognition, amplifies differentiation, and makes big ideas and meaning accessible and takes disparate elements and unifies them into whole systems” (p. 4). With an identity clearly articulated, it makes it easy for the consumers to engage with the brand, make it easy for the sales force to promote the brand, and make it easy for the brand owner to develop brand equity (Wheeler, 2013, p. 11). Metaphorically, brand identity is like a tree, which provides the shadow for brand trust and other aspects of brand organism to arise.
Although the tangible expressions of brand are important, it is the intangible nature that makes brand successful. In other words, it is the organism aspect of brand that leads to a popular acknowledgement of brand as an intangible asset (Wheeler, 2013), which captures the brand perceptions and attitudes of consumers towards the brand, including the brand knowledge created. According to Keller (1993) and other researchers (such as Park et al., 1983), brand knowledge is partly reflected by means of the awareness of consumers towards the brand, the brand image and perceptions formed, including attitudes and brand associations, which is a dominant driving force behind the formation of brand equity. Apart from the cognitive aspect of organism, such as brand knowledge, brand perceptions or images, the emotional brand value of an offer is equally important (Baloglu and Brinberg, 1997).

In sum, the accumulative effect of the organism nature of brand should eventually turn brand into the messenger of trust, leading to repeat-loyalty as a response criterion for success. Repeat-loyalty indicates that consumers have formed a positive relationship with the brand (Fournier, 1998; Dall’Olmo et al. 1997), which could be further characterized in terms of love and passion, self-connection, commitment and inter-dependence. As a result, the following hypothesis brings about the closure for the SOR model development as depicted diagrammatically in Figure 1.

H3: Brand organism is a significant predictor of positive brand response.

The SOR model advocates that both the stimuli and the organism variables should be skillfully orchestrated in order to provide the basis for an effective brand building. In other words, brand management should be Gestalt in concept, by including the aspects of stimuli and the intangible organism (cf. Tan, 2018a; Morgan and Pritchard, 2002) as the areas of opportunities which the brand owners and managers should actively seize in order to influence the perceptions, attitudes and behaviors of the consumers (Wheeler, 2013; Tan, 2017a; Tan, 2018a;b).

Research Method: A brand model research study not only validates a conceptualized model, but also it can help to clarify branding strategy, designing identity, and by the significant stimulus variables, creating the touchpoints and managing brand assets. A competitive brand strategy should convey a clear positioning of the brand. Positioning, according to Wheeler (2013), is “a process to identify what boldly differentiates a brand in the mind of a customer. Customers are overwhelmed with choices. Positioning has the potential to create new openings in an oversaturated, continually changing marketplace. The best positioning builds on a deep understanding of customer needs and aspirations, the competition, the strengths and weaknesses of a brand, changes in demographics, technologies and trends” (p. 136). This research underlies a positivistic paradigm which relies on the extant literature to articulate a well-known SOR theory of consumer behavior in the context serving for the purpose of brand management. The variables and constructs involved are operationalized by meeting the validity and reliability requirements of a quality, rigorous research, being realized by adapting commonly acknowledged definition of variables and constructs in the extant literature as well as by ensuring the contents of measurement statements fitting the research issue. The readers can refer to Tan (2017), Tan (2018a), Tan (2018b) and Tan and Patthracholakorn (2018) for some of the operationalization guidelines and details.

Results: Two empirical cases presented below support the three hypotheses and provide the statistical analysis evidences for the validity of the SOR model. All the variables were tested to comply with the validity and reliability requirements, evidenced by the total variance extracted (TVE) crossing the 0.50 threshold, reliability index beyond 0.7-0.80 thresholds, and the square-root of TVE exceeding the cross-correlations coefficients, which result in proven convergent and discriminant validities.
Case 1: Tae-tea brand in China: The first case studied the consumer perceptions of Tae brand in Yunnan province of China. A valid 423 collected dataset was used in the structural equation modeling (SEM) analysis, which shows excellent model fits, evidenced by Chi-squared 6.964, at p = 0.223 (not significant), GFI (Goodness-of-fit Index) = 0.996, AGFI (Adjusted GFI) = 0.967, NFI (Normed Fit Index) = 0.998, RFI = 0.982, IFI = 0.992, TLI (Tucker Lewis Index) = 0.996, CFI (Comparative Fit Index) = 0.999, and RMSEA (Root Mean Square Error of Approximation) = 0.031 (less than 0.05 threshold), and the standardized RMR = 0.0057. The SEM configuration validates the SOR structure and supports the three hypotheses stated. The Tae-branded products and the shops are depicted in Figure 2 and the SEM structure is presented in Figure 3.

In the SOR model depicted in Figure 3, the stimuli are consisted of social interaction on Pu’er tea topic, the general benefits of drinking tea, marketing strategies which are specific to the Tae-brand, and the decision-making style of consumers. For the latter, the two significant ones are perfectionistic, high-quality conscious style and novelty, brand conscious style. The former is operationalized by the measurement statements: “When it comes to purchase products, I try to get the best; I look carefully to find the best value for the purchase; In general, I usually try to buy the best overall quality.” For the latter, the measurement statements used are as follows: “The well-known national brands are best for me; The more expensive brands are usually my choice; I prefer buying the best-selling brands; The most advertised brands are usually good choices; The higher the price of a product, the better the quality.”
The general and the comparative profiles of the 423-collected data are presented in Table 1. By use of ANOVA and t-tests, the dark-colored box presents the areas of significant differences between the elements of the categories studied. Clearly the brand owners and managers should develop special branding and marketing campaigns to further tighten the connection with the existing consumers, and also for consumers who have already formed habits of drinking teas. The tea exhibition is another area which should be creatively targeted.

Table 1: The General and the Comparative Data for Tea-Brand

<table>
<thead>
<tr>
<th>Construct</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand Loyalty</td>
<td>3.86</td>
<td>3.92</td>
</tr>
<tr>
<td>Brand Image</td>
<td>3.87</td>
<td>3.92</td>
</tr>
<tr>
<td>Customer Satisfaction</td>
<td>3.32</td>
<td>3.94</td>
</tr>
<tr>
<td>Customer Value</td>
<td>3.33</td>
<td>3.89</td>
</tr>
<tr>
<td>Social Interaction</td>
<td>3.41</td>
<td>3.83</td>
</tr>
<tr>
<td>Tea Benefit</td>
<td>3.42</td>
<td>3.83</td>
</tr>
<tr>
<td>Marketing Strategy</td>
<td>3.43</td>
<td>3.84</td>
</tr>
<tr>
<td>Perfectionality</td>
<td>3.44</td>
<td>3.85</td>
</tr>
<tr>
<td>High Quality</td>
<td>3.45</td>
<td>3.86</td>
</tr>
<tr>
<td>Conspicuousness</td>
<td>3.46</td>
<td>3.87</td>
</tr>
<tr>
<td>Brand Trust</td>
<td>3.47</td>
<td>3.88</td>
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</tbody>
</table>

Table 2: The General and the Comparative Data for Tae-Brand

<table>
<thead>
<tr>
<th>Construct</th>
<th>Frequency</th>
<th>Percentage</th>
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<tbody>
<tr>
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</tr>
<tr>
<td>Strategy</td>
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<td>Perfection</td>
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<td>High Quality</td>
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<tr>
<td>Conspicuousness</td>
<td>3.49</td>
<td>3.90</td>
</tr>
<tr>
<td>Brand Trust</td>
<td>3.50</td>
<td>3.91</td>
</tr>
</tbody>
</table>

Case 2: Alipay Mobile Payment: The Alipay consumers in China were targeted in this case, and of which 433 valid responses were obtained. Figure 4 exhibits a store accepting Alipay mobile payment system which is a common scene across China. The photo was taken by the author recently in Kumming city, of Yunnan province of China. This case also shows perfect SEM model fit which reflects the validity of the SOR configuration, evidenced by RMSEA at 0.051, CFI at 0.998, TLI at 0.998, IFI at 0.998, RFI at 0.949, NFI at 0.989, GFI at 0.979. Noticed from Hair et al. (2006), RMSEA reflects a good fit when its value is ≤ 0.08.

Figure 4: The Use of Alipay Mobile Payment

Shown in Figure 5 is the SOR structure that describes how the brand owners can make use of unique features of the brand such as products and service features, and the perceived usefulness and ease of use of the products and services, to influence the “Big B” Brand perceptions (i.e. image and customer value), brand trust and attitude, which in turn, can improve the explanatory power for the arising of brand loyalty.

and experience sharing. The latter highlights the externality impact as a result of positive brand responses of the consumers.

Figure 5: The SEM Structure of Alipay Consumers

While many of the constructs can be measured by referring to the extant literature, the most unique ones are brand image, brand trust and brand attitude:

- **Brand attitude** – Alipay makes life easier for me. I enjoy using Alipay to do transactions. It is a worthwhile experience using Alipay. I feel happy to live with a world that has Alipay.
- **Brand trust** – I feel comfortable using Alipay to accomplish my tasks. Consider Alipay is the first choice for me when I need to accomplish a mobile payment. Alipay always delivers what they promise.
- **Brand image** – I believe Alipay possess a positive symbolic meaning. To me, Alipay symbolizes reliability. Alipay is strongly reliable, trustable and has excellent safety measures. I feel that Alipay can relate to the pleasant experience. To me, Alipay is a brand of high creativity. To me, Alipay delivers an image of differentiation, always attempting to make a difference in the world and in my life.

There are some significant important differences which Table 2 presented. For instance, the Alipay consumers who rarely use the Alipay mobile payment system usually have lower level of perceptions, but this is very minor, as the country is now popularized by mobile-payment usages as normal transactions in payment. In addition, those who use the Alipay service options in larger extent also generally have more positive perceptions and attitudes towards the Alipay brand.
Table 2: The General and Comparative Data for the Alipay Consumers

<table>
<thead>
<tr>
<th>Description</th>
<th>Frequency</th>
<th>Percentage</th>
<th>Subjective Norm</th>
<th>Perceived Behavioral Control</th>
<th>Perceived Efficacy</th>
<th>Brand Trust</th>
<th>Brand Image</th>
<th>Customer Value</th>
<th>Brand Loyalty</th>
<th>Experience Sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>187</td>
<td>19.3%</td>
<td>3.95 ± 1.06</td>
<td>4.08 ± 0.94</td>
<td>3.96 ± 1.02</td>
<td>4.13 ± 0.67</td>
<td>4.19 ± 0.64</td>
<td>3.88 ± 0.86</td>
<td>4.08 ± 0.70</td>
<td>3.90 ± 0.74</td>
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<td>243</td>
<td>24.9%</td>
<td>3.89 ± 1.05</td>
<td>4.08 ± 0.94</td>
<td>3.96 ± 1.02</td>
<td>4.13 ± 0.67</td>
<td>4.19 ± 0.64</td>
<td>3.88 ± 0.86</td>
<td>4.08 ± 0.70</td>
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<tr>
<td>Occupation</td>
<td>57</td>
<td>5.9%</td>
<td>4.13 ± 0.73</td>
<td>4.04 ± 0.84</td>
<td>3.91 ± 0.81</td>
<td>4.12 ± 0.47</td>
<td>4.17 ± 0.49</td>
<td>4.08 ± 0.70</td>
<td>4.08 ± 0.70</td>
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<td>Age</td>
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<td>12.5%</td>
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<td>4.10 ± 0.81</td>
<td>3.96 ± 0.84</td>
<td>4.12 ± 0.47</td>
<td>4.18 ± 0.50</td>
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<td>Occupation</td>
<td>77</td>
<td>8.0%</td>
<td>4.13 ± 0.73</td>
<td>4.04 ± 0.84</td>
<td>3.91 ± 0.81</td>
<td>4.12 ± 0.47</td>
<td>4.17 ± 0.49</td>
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<td>Age</td>
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<td>6.3%</td>
<td>4.15 ± 0.70</td>
<td>4.10 ± 0.81</td>
<td>3.96 ± 0.84</td>
<td>4.12 ± 0.47</td>
<td>4.18 ± 0.50</td>
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<td>4.08 ± 0.70</td>
<td>3.90 ± 0.74</td>
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<tr>
<td>Occupation</td>
<td>120</td>
<td>12.5%</td>
<td>4.15 ± 0.70</td>
<td>4.10 ± 0.81</td>
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<td>4.08 ± 0.70</td>
<td>4.08 ± 0.70</td>
<td>3.90 ± 0.74</td>
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Conclusion: This research extends the works of the researcher in various aspects of the SOR applications, such as in tourism (Tan, 2017; 2018), wedding services (Tan and Pattharacholakorn, 2018), and many other fields such as logistics, restaurants, education, hotels and consumable products (Tan, 2018b). The two cases presented in this article demonstrate the validity of the SOR theory and model. The structural equation modeling (SEM) analysis shows high-variance fits. The SOR model is flexible as the researchers and the practitioners can provide the varying details for the latent constructs S, O and R. There are some important implications. First, the SOR is a suitable brand management model extending from the field of consumer behavior. Second, the stimuli may be more of tangible expressions but should not ignore the intangible aspects of stimuli such as attitudes, subjective norms, decision-making style of consumers, and identity matching between the consumer and the brand. Third, the stimulus is predominantly a “small b” issue with a particular emphasis on the stimulation nature and function. Fourth, the organism is predominantly a “big B” Brand issue which should consider its primarily role in driving consumer’s brand responses, and should have the direct impact from the stimuli. Fifth, each of the dimensions of the SOR constructs should consider from a Gestalt picture that actually reflects the issues and contexts of the brand. Six, the brand stimuli should possess two important qualities, namely the integrity of the offers (known as brand integrity) and the identity of the brand (known as brand identity) in supporting favorable brand image formation.

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References:


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Chai Ching Tan
School of Management, Mae Fah Luang University
E-mail: drcctan@yahoo.com, tan.cha@mfau.ac.th.
CROSS CULTURAL AND DIVERSITY MANAGEMENT IN GLOBALIZATION

METHTEE CHANTED, WORAKAMOL WISETSRI, PANADDA CHAROENSAK

Abstract: Today, the world is changing rapidly in term of society, economy, politic and technology because of the information technology development and the global political economy structure changing. As a result, countries in the world have to rely on each other and more interconnected. Globalization also affects the organization that has not even expanded into the international market but also other foreign business organizations that expand their business in the country and take over the business market sharing. So, it is very important for new managers to understand globalization and has the capacity to handle the challenges posed by globalization in particular, diversity management in the organization to work effectively. The problems of diversity are the difference of age and lifestyles, family background, sexual differences, qualification and graduation, foreign workers with different cultures, the employment and the physical condition. The strategies that HR needs to manage this diversity are: create activities to promote teamwork and unity in the organization. Use the same communication in all level. Train employees to have a positive attitude towards colleagues and organizations. Brainstorm to solve problems or obstacles in the work and self-development. Promote employees with fair benefits, and improve the workplace or office to reduce the difference.

Introduction: Nowadays, the world of business is more multinational and most of them are accepted by the global market and very successful in term of market management and technology. For doing business overseas, companies from the investor country cannot be operated by individuals from their home countries due to high costs and economic reasons, politics and government of the host country. So, those companies must be able to utilize the resources available in the host country where they invest most effectively whether human resources, capital, technology, or other management. If the executives or managers of multinational companies cannot motivate and reassure employees from both parent companies and local employees, business in a foreign business cannot be sustainable. In term of the developing process of other multinational companies, executives will easily face with the misunderstanding between people because companies may ignore employee development and do not provide sufficient opportunities for career growth to employees without consideration of race and religion but based on talent and dedication to the company while everything is controlled under the parent company manager.

Human resources are an important resource for organizations to push all drive for success and achieve the desired objectives. Therefore, manpower is the key of success in organization. If lacking of quality in manpower, organization will not be success. Beyond the capacity of manpower in organization, those people need to learn about cultural organization, willing to work, dedicate themselves to work followed by the purpose of the organization including pay attention to their work. These are not going to happen if they cannot feel company like family. Organizations should pay attention to these people by creating good feelings for employees to make them feel to be a part of the organization as well as to provide opportunities for the advancement of talented employees to make them feel they are the ones that the organization need and to create the security for employees themselves to grow in career path (Marie-Thérèse Chicha, 2006, sector 3)

Therefore, every organization needs to make employees feel committed to the organization because if employees are committed to the organization, it will reflect the success of the organization’s human resources management. It also helps to reduce the costs that will occur such as expenses for hiring new employees, the cost of training including reduction in operating power in both quantity and quality. The study of employee engagement with organizations is important for executives to pay great attention to set the guideline for human resource strategies and policies to meet employee needs and organizational goals to achieve the highest efficiency and effectiveness.

The diversity of employees or workforce diversity has both impacted on success or barriers to work. So organization must have strategic and good management to set the possible direction. If management does not take in any action, it will become a management problem and conflict themselves.
Cross culture and diversity issues in society have become a problem in the workplace such as racial differences, religion may sometimes appear to be violent or discriminatory including in politics, ideological differences or political support would make social conflict. Moreover, there are practical insights from cross culture and diversity such as (Faranani Facilitation Services Pty Ltd, 2013)

1. The age of people is difference. Each age will have different lifestyles. New generation is active and grows fast especially in a group of talented people while older people (some) begin to run out of energy and many life problems become interruptions and obstacles. Moreover, older people have the limitations to promote. It is a problem of dissatisfaction with the management’s policy. For example, assume companies have gaps between ages problem. Over 50% of employees age 50 and over, and 40% are teenagers aged between 20-30. Companies lack employees’ age between 35-40 because companies haven’t recruited middle people for a long time. So how to develop a person to replace each other?

2. The differences of gender make companies cannot meet the equality. It seems not to be the big problem but it could be if the amount of men and women doesn’t balance. Moreover, LGBT is also a management issue in term of communication styles and discrimination. The ignorance of the heterosexual became a problem and creates the dissatisfaction of people as well.

3. The difference of Institute where seed ideas will be the majority problem to develop organization. The protecting their institutions or Institutionalism becomes a barrier for those who did not finish the same institute. Employees who graduated from high ranking institute may look down someone who graduated from unranking institute.

4. Regionalism is the same problem of institutionalism. When people come from same place, speak same language will be the problem for discrimination and bias such as when there is disciplinary action, punishment may be reduced or give special favor for close people.

5. The nature of employees working together will group together. People who have been working so long will obstruct those who move from other agencies. People who use to work together and move to new company as a group will have internal group activities or different working style. For other example, someone who has worked for Western company or Eastern Company will have different idea.

6. International Investment Company and set business in host country make local employees need to develop. Host staff will work with the management or foreigners will have problems in communication that try to make the understanding in the same direction. Cultural differences may cause host staff does not understand or accept. It will be a conflict or dissatisfaction.

7. Hiring many foreign workers to work in businesses such as fisheries, agriculture, they have to face with the difference in language and culture that cannot be harmonious with people. But it is a group of silent or frightening influences in the future, if host staff cannot be harmonious.

8. Characteristics of occupational groups effect on career development. Each work group has different knowledge, confident and ego is very high such as doctors, engineers or academics. If you do not care about the feelings of people in different professions or business, it would be a big problem as well. For example, the career path in organization to executive positions is reserved only for main line or monopoly.

9. The different of employment Patterns make unfair benefits. Many employees have to work in the same position but difference condition such as regular employee and contract staff. The benefits for each condition are different. Employees often compare these differences and try to appeal for better benefits. It can be observed by responsibility, honesty, loyalty, or dedication to work in a different way.

10. The structure of the company is changed, such as employees of affiliated companies. , staff came together because of the merger, company collapse, management team changed, the employment conditions of these different employees will become disunion.

11. Difference of employees who are members of unions and not a member will make life may lack of happiness.

12. The workplace where have personnel conflict, internal competition become internal political issue. Bigger group will have more power and more authority to demand than group with less people.

13. Group of employees who are different in status, family values, and taste would make organization move slow. Some groups come from the elite or high society and spend luxury life while other groups come from the remote provinces and spend life slow.
Diversity and Competitive Advantage is personnel diversified management that the organization is the highlight this research by informants are professional human resources company from the top 100 companies in the world, based on Fortune’s diversified range of management ratings to give the company has competitive advantage. These factors include organizational culture promotes diversity, personal morality, recruiting and personal retention. (Mark Feffe, 2015)

Diversity and Competitive Advantage is personnel diversified management that the organization has undertaken for the purpose of increasing its competitive advantage. For example, 40% of companies provide information in research, training provided to all people who has leadership. 34% have more innovation by pulling from the capabilities of the people background. 31% use different experiences to make the transition, special projects and assignments (Evren Esen . 2005.)

Based on this research, it indicates that companies with good management prioritize the importance of diversity and cross cultural management to become a valuable asset. Practically, it is difficult to manage diversity with all people in organization. So, organizations have to select the way to manage diversity by using the best practices to make organization success in human resource unit.

Sodexo, worldwide healthcare company is one of the successful organizations with competitive advantage by using diversity to create the company’s competitiveness, company growth, prosperity and elegance. Sodexo keeps the balance of sex and gender identity. There are many labor force ages. Moreover, Sodexo provide the desirable environment of all races and cultures including create personal values through organizational culture that promotes diversity. Sodexo uses diversity strategy to aim to be a competitive company with companies around the world in terms of diversity and integration that is the one pillar of the strategy that means the company is committed to the diversity of all personnel levels in the field of gender, gender identity, age, labor, culture, race or physical disability (Sodexo, 2017)

Diversity Management, DiversityInc has integrated the best practice of Diversity Management by collecting information from the top 10 diversified companies (DiversityInc. 2012)

1. Leadership is highly committed. Leaders must have a vision of diversity, high commitment, express the feelings and communicate throughout the organization.

2. Bring the diversity to be a part of organizational strategy. Diversity strategies and human resource development plans must be aligned with the organization's strategic plan.

3. Link diversity to performance. Understand the difference of culture and diversity including working environment that can increase productivity and improve the workforce efficiency.
4. Measure both quantitative and qualitative that effects on project variances, working plan and activities related to diversity.
5. Leaders must have strong responsibility to diversity by connecting with working evaluation and compensation lead to diversity progress.
6. Set the strategic process for identifying and developing a variety of good people to be potential leaders in the future.
7. Set the Recruiting process to convince job seekers with outstanding qualifications.
8. Support people at all levels to drive organizational diversity. Everyone has equal opportunities to grow in career path.
9. Train and develop people by focusing on diversity in the organization. Organizational leaders must inform and educate executives and practitioners about diversity.
10. Organize activities by linking happiness to work for all groups such as female group, male group, LGBT groups and the physical disability.

From the best practices above will make both executives and HR need to think about what they need to create as common goals which are working standards, harmony, and teamwork. Therefore, the HR function must work strategically that mean looking at the changes would occur and find ways to prevent or solve the problem. If both of them do not care, the problem will grow continually and too complex to solve. Problems will expand to be disunion. The problem of difference is the problem that HR cannot avoid because it is about people in organization that is one of HR responsibility. So this situation will challenge HR how to create a managing strategy in diversity effectively in organization.

Cross cultural management and diversity management.
The general strategies that HR and management must take to terminating, reducing, preventing or addressing variety of issues are
1. Harmony
If possible, this strategy should be used. Harmony is a combination policy to be unity. For example, organizations with Thai and foreign employees, heterosexuals or organizations with new employees should know each other and continuously communicate between groups. Communication will make organization to be more unity and became the same new society. Organization creates harmony by learning each other, working together, thinking, planning problems. Helping each other and Co-activity will make problems gradually disappear.
2. Seeking joint point to be conservation points.
If organization cannot combine variety of diversity, one thing that must do is acceptance in diversity by respecting each other, avoid saying weak point such as the religious issue. Even employees who have difference religion cannot join rituals with large groups but some activities should invite to participate in a way that they can do together. Although they are different but they can work together, be good colleague.
3. Division and rules
Management and HR need to set policy and rule for people to live together with happiness. Organization should give them equal basic rights and give them a freedom to take care of each other or set representative system of the group. For example, Burmese migrant worker group who work in Thai company that is large group and work with Thai people. It is difficult to communicate or to understand each other. So, company need to create unity by selecting worker who can speak Thai to be representative of Burmese group. Company will communicate through representative and they will transform all information such rules, policy to make the understanding and work together between Burmese and Thai. HR must bring the best practices to create organizational activity and use techniques to manage diversity and cross-culture to prevent any concerned problems would occur.
1. Organization Analysis (SWOT) considering the current and future environment including the possibility of the current and future problems to guide to set policy or problem solving strategies that may come in the form of activities.
2. Learning from each other will help people know each other. Organization must select activity to promote team working to make differentiate people learn and understand different people with different lifestyles. People come from difference generation does not understand how to think or the expectation of another people. In fact, all ages are dependent on each other such as old employees need to learn new technology from new face etc. while old staff has outstanding such as skills,
experience in teaching, coaching, consulting. So, managing techniques should be taken in term of knowledge management or learning exchange. Sometimes it must be created multicultural learning to give a chance to people from difference culture to understand other culture. For example, Japanese worker who has to work in India should understand Indian by find a change to socialize with Indian people will help to adjust to live together (Clare Moonan, 2013).

3. Communication will explain everything. Something cannot be adjusted equally. So, the communication and explanation will be the tools to make clear to people. However, organizations need to prepare standard rights to all people equally.

4. Training is the important tool to educate employees and give them good attitude each other in term of positive thinking, proactive thinking, working together, thinking together, conflict solving and self-development.

5. Improvement of employment conditions and benefits make people in difference level feel more confident. To be equal or slightly difference is the most important issue that management in organizations should reconstruct such as mergers, acquisitions and employee transferring to new employers. Moreover, company need to add some benefit for the group that feel bad about less benefit to make them feel win together with organization. For example, some management cannot get overtime wage in weekday but they will get extra pay if work in weekend.

6. Improving workplace or office to reduce difference. Staffs in difference positions always have different ideas and sometimes they do not understand each other. Staffs would think they work in bad atmosphere without facilities while others work in good surrounding. To decrease the sense of unfairness, organization should provide co space to do activity for all staff. They will feel relax and equality.

When HR understands and learns all techniques and try to find the best practice of diversity management for employees, problems about culture shock and diversity will less gradually. The goal of cross cultural management and diversity management is to integrate and share the organization vision for all people to involve in the same goal and contribute to the great spirit in workplace.

Cross-cultural Management and Diversity study, the Human Resources Management role (Nalina Ganapathi, 2013) is a course for business in environmental variety combining both art and science including strategies and communication techniques in cross-culture to ensure that students are able to apply in real life and business situations. The course will include the necessary knowledge and skills to provide students to be expertise in cross-cultural management and diversity. It will focus on both practical and theoretical issues including activities selected based on real business situations to apply in real work. Moreover, students will learn about what is the importance of practical insights from cross-cultural management and diversity management. Course description will include the causes of many organizational problems and intercultural relationships including how use knowledge to deal with a variety of cultures. It also helps to overcome obstacles by using cross-cultural communication, determining the strategies and techniques of cross-cultural management and diversity whether negotiated pattern, discipline, intercultural relationship, cross-cultural accessibility to develop their own capabilities in cross-cultural management and diversity.

References:


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Methee Chanted
Lecturer, Eastern Asia University, Pathum Thani, Thailand

Worakamol Wisetsri
Assistant Professor, King Mongkut’s, University of Technology, North Bangkok

Panadda Charoensak, Thailand
A CURRENT SNAPSHOT OF TOURIST ATTITUDES AND BEHAVIORS TOWARDS LAO PDR

KHAMXAY BOUNMIXAY, CHAI CHING TAN

Abstract: Motivated by a desire to fill an empirical gap studying how the tourists form of their attitudes and behaviors towards Lao PDR, through representative cities Vientiane and Luang Prabang, this research thus is initiated. The research focuses particularly on the cognitive and affective aspects of the destination images, and studies how they influence tourist satisfaction and further onto response behaviors such as recommendation to others. The study incorporates many demographic variables but they show no significant differences. The study confirms the significant roles of both the cognitive and affective attributes of destination images on tourist satisfaction, which in turn predicts recommendation of the destination to others. Nevertheless, this study shows that tourist satisfaction is not able to make tourists form positive revisit intention, which also shares the tourism and travel competitiveness study by the Economic World Forum (2017), with Laos ranked 94 globally.

Introduction: This research is motivated by a significant lack of empirical research that aims to identify the nature of destination images inducing tourist satisfaction in Laos, and the research findings could suggest to the policy makers on destination branding. In other words, through identifying the nature of destination images that have significant predictive impacts on tourist satisfaction, an effective tourism strategy could be developed (Baker and Cameron, 2008). Most destination management organizations and national policy makers can not easily get their hands firmly gripped on the destination image branding because there is a lack of tourist perceptions as well as a lack of clear identity and vision of the destination, which complicates the process of destination branding (Ryan, 2010).

In this research study, only cognitive and affective attributes of the destinations are considered, as these two domains of images have been empirically validated by other researchers to best produce memorable experiences and satisfaction (cf. Wang and Hsu, 2010; Tan, 2017; 2018a; 2018b). Besides, many researches also confirm that image is an effective means to create and realize unique destination positioning (Park, Qu and Lee, 2011) in the minds of the tourists (known as mind share, Tan, 2018b). In sum, the research objective is stated as follows:
The purpose of this study is to empirically verify the predictive powers of both destination’s cognitive and affective images upon tourist satisfaction, which in turn influences tourist attitudes and behaviors in terms of recommending the destination to others and revisit intention.

The next section would provide the theoretical basis to address this research objective as well as the empirical context so that the contents of both cognitive and affective destination images could be operationalized in more descriptive manner. Cognitively, cultural heritage, place national identity and festival and events are considered. In affective attribute aspect of destination images, friendliness and relaxing mode of the experiences are emphasized.

Literature Review:
Laos as Tourist Destination: The Lao People’s Democratic Republic (Lao PDR or Laos) is one of developing countries located in Southeast Asia. In 2017, the tourism-industry share of the Gross Domestic Product (GDP) for Laos stood at 13.7 percent of GDP (or 2 billion USD), significantly behind its neighboring countries such as Cambodia (28.3 percent of GDP, at USD 5.5 billion) and Thailand (82.5 billion, or 20.5 percent of GDP). Tourism industry is also a key national industry plan for Lao PDR (Engelhardt & Rattanavong, 2004). Tourism resources, albeit remained weak when compared to other ASEAN counterparts (World Economic Forum, 2017), are considered abundant in Lao PDR, and are endowed with natural attraction sites, many interesting world heritage sites, and historical and cultural sites. To give more details, the cultural activities are commonly presented through the nation’s traditions, practices, values, and ways of life including annual events and festivals.
In each year, Laos could seize the advantages of its geographical uniqueness and characteristics, natural resources, and cultural and historical tourism to draw the many thousands of visitors to their country. Laos comprises of a diversity of ethnic groups which can bring wide-ranges of different aspects of experiences and exposures to tourists. Another outstanding feature which is widely said about the locality among the travelers who visit the country is the hospitality and the friendliness of the local people. The sense of these excellent receptions as willingness to open their local cultures to the visitors is considered as another motive for touring Laos. Collectively, the friendliness and the many various cultural aspects of the country could lead to unique Laos national identity, which can attract not only domestic but also foreign tourists to go travel and sightsee places in the country in order to gain more understanding towards Laos context through memorable experiences. In general, the country allows the tourists to access not only the outstanding historical and cultural experiences but also the opportunities to associate oneself with the ecological preservation and interesting places in nature e.g. the Nam Ngum Reservoir and the Bolaven Plateau.

To make possible a continuing increase in the values of the tourism industry, the Ministry of Information, Culture and Tourism (TMICT) is charged with the duty. TMICT is tasked to conduct and launch research strategic plans and public policies, including developing and promoting the public relations of the tourism industry in Laos through the share of the information and cultures with the aims to boost the growth in tourism industry (National Tourism Authority of Lao PDR, 2012). Nevertheless, according to the statistics report by the Ministry of Information, Culture and Tourism (2017), the tourist arrivals had in fact threaded on a downward direction, dropping a 20% in two years since 2015 to 2017, to about 3.8 million tourist arrivals. The revenue-earning trend shares similar downward trend, dropping from 725 million USD at peak to 648 million USD in 2017. On inferences, one would assume a lower level of peer reference influences by the tourists to potential tourists. Towards this end, a research objective that aims to study and suggest exploitation of the cognitive and affective images of two representative cities Luang Prabang and Vientiane is raised for evaluating their impacts on tourist satisfaction and tourist attitudes and behaviors in terms of recommending the destinations to others and revisit intentions.

**Luang Prabang and Vientiane – Most Visited Destinations in Laos:** There are many attractions in Lao PDR which can make the visitors or tourists entertained and delighted, and Luang Prabang and Vientiane are among the two most visited destinations. Vientiane is the capital city of Lao PDR, and it has a population around 200,000 among the 6 million of the nation. Vientiane is the most developing part of the country (Yamauchi & Lee, 1999), comprising of many interesting inducements for those who would like to learn of ancient culture and perceive the cultural and historical understanding of Laos because the city is full of cultural sense, of which the visitors could find themselves in the Laotian’s way of living, the unique accent of national language from the local citizens, the cultural clothing, furniture, and food. With all these great features together, it has made the city in the World Heritage in 1995, December 9 (Semone, 2012).

Similarly, Luang Prabang- the capital city of Laos – is also registered under the title of World Heritage, and is renowned for its well-abundant natural resources such as the natural waterfall. The must-see attractions include historical monuments and ancient monasteries (United Nations Education, Scientific and Cultural Organization, 2004), i.e. “Prabang” Buddha statue, Royal Palace (Department of Finance in Luang Prabang, 2006). This sense of Laotian’s culture across this city has greatly attracted the great number of tourists since the past and makes them to revisit the places again. Apart from these interesting tourist attractions, one of the main reasons to travel in Luang Prabang and Vientiane is the identity in ceremony of Luang Prabang which also reflects the national identity and presents the cultural heritage of Laos. For instance, Laos’ New Year Festival is regarded as the biggest festival of the country. In the festival events, many cultural shows including the folk music and dance would be on the shows.

**Hypotheses Development and Conceptual Framework:** Martinez and Alvarez (2010) studied about the influence of the destination image on investment opportunities. According to their results, a positive destination image can greatly improve the business and investment opportunities. Thus, cultivating destination images is strategically vital as income attractors. In addition, imagery could play the
reconstructive roles in that the tourists formed of positive images will purchase souvenirs for memory, and say positive words of the destination experiences to others (Selby and Morgan, 1996).

Destination image is an important construct that is widely applied in both marketing and behavioral sciences (Kim, McKercher and Lee, 2009; Mayor, 1973) and branding discipline (Tan et al. 2018). A detailed study of destination image perceptions can be used to shed light on the nature of marketing and brand stimuli (Tan et al, 2018), forming the potential practical implication of this research. In similar counts, Crompton (1979) and other researchers reckon that the consideration of destination images i.e. “the set of impressions, ideas, expectations and emotional thoughts an individual has of a specific place” (Stylos, Vassiliadis, Bellou and Andronikidis, 2016, p. 41) should be important priority for policy makers and researchers.

The construct, “destination image”, is a multi-attribute concept (Gallarza, Saura and Garcia, 2002); for instance, MacInnis and Price (1987) state that the image of destination is associated with the whole consumption experience of a person. In another occasion, Australian Tourist Commission (ATC) found that the destination image which had been promoted to the tourists internationally by the Australian authorities do have significant impact on the very positive perspective of international tourists towards the image of Australia. The end result is it creates the travel desire of international tourists compared with other destinations which was not promoted, further reinforcing the role of destination images.

Destination image can be derived from both the physical appearance and the intangible attributes offered or are associated with the destinations. The latter includes the ideas, beliefs, attitudes, practices, and values of such destination including cultures and heritages (Tan et al., 2018), which could create the impressions to the individuals and become their tourist destinations as a consequence (Cakmak & Isaac, 2012; Frochot & Kreziak,2008). Kotler and Gerner (2010) state that the destination image could also include the location, and leadership, as well as economic situation or stability of the state. The intangible sources of impressions to tourists indicates that the impressions towards destinations do not need to be real, which imply the role for imaginary. However, these impressions must have the potential enough to draw the tourists’ attentions. The illustrated are just the different manifestations of the destination image.

Specifically, as the image which the tourists formed of the destination could be considered as the outcomes of the tourist experiences of the destination (Pearce, 1982), the destination image thus has evaluative (cognitive) and affective components. The interaction of the cognitive and affective aspects is creating the whole destination image via the comprehensive evaluation of individuals on the destination. The evaluations, on both cognitive and affective attribute domains, can be positive or negative (Beerli and Martin, 2004), which are operationalized in this research by means of Five-Likert Scale (1=strongly disagreed, to 5=strongly agreed).

San and Rodriguez (2008) claim that the summative destination image perception of tourists could be shaped through the cognitive process within the individuals’ mind. Tan et al. (2018) call the cognitive process the stimuli – factors that stimulate the cognitive reasoning and perceptions development of tourists. Not only the contribution of cognitive mental representation of the destination on the overall impression (San and Rodriguez, 2008) is reckoned, but the associations which derive from cognitive sources can infer favorable judgments about the destinations (Oliver, 1997), known as tourist satisfaction. Towards this end, the following hypothesis is assumed:

H1: Cognitive destination image is a significant predictor of tourist satisfaction

On the other hand, affective evaluation is also shown important by many researchers (Stylidis, Shani and Behlhasen, 2017). While cognitive is more of an objective knowledge in nature, affective is subjective knowledge of the tourists. The affective destination image perception has a predictive role to satisfy customers (Papadimitriou et al., 2013) which can influence choices and preferences of tourists over sets of destinations. Affective destination image is the set of feelings which the tourists express of the subjective knowledge and emotional thoughts of the destination visited (Stylidis, Shani and Belhassen, 2017), and marketers can exploit affective images to promote the destination intents of visitors as well as shape the
positive feelings of tourists towards the destination (Basaran, 2016). As a result, the following hypothesis is assumed:

\[ H_2: \text{Affective destination image is a significant predictor of tourist satisfaction} \]

In sum, both cognitive and affective attribute domains of destination image are relied upon to facilitate the careful examination of destination image. Briefly again, the cognitive component of the destination image refers to “a person’s beliefs and knowledge about a destination and its attributes” (Stylidis et al., 2017, p. 185), and the affective component of the destination image denotes “a person’s feelings toward and emotional responses to a destination” (p. 185). As tourists feel positive towards such destination, they tend to revisit the destination and recommend positively to others (Beerli and Martin, 2004), as they already experience the travel quality and expect the next visit to remain in the same quality of vacation, leading to recognize the following two hypotheses as closure of the theoretical framework that underpins a stimulus-organism-response (SOR) concept (referred to Tan, 2017; Tan, 2018a; Tan, 2018b):

\[ H_3: \text{Tourist satisfaction is a significant predictor of recommendation to others.} \]

\[ H_4: \text{Tourist satisfaction is a significant predictor of tourist’s re-visit intention.} \]

In conclusion, the conceptual model shown in Figure 1 is derived, with \(H_1\) and \(H_2\) represents the S-O (stimulus-organism) linkage, and \(H_3\)-\(H_4\) represent the O-R (organism-response) linkages.

![Figure 1: Theoretical Framework](image)

**Method:** The research is explanatory in nature which is based upon deductive steps taken to extract and organize important theoretical concepts from the extant literature as well as relevant factors that the author consider most fit to describe the image perceptions of Laos. Having realized the important role of destination images in positioning and drawing tourist interests (Kim et al. 2009), and with an obvious gap relating how the destination images played in the predictability role in explaining tourist satisfaction and responses, this study thus is initiated.

Based upon also a survey-based quantitative research method, a systematic procedure should be followed in operationalizing the variables or constructs involved. In the operationalization process, the extant literature (for instances, Kim et al. 2009; Kock et al. 2016; Stylidis et al. 2017) is exploited to the benefits. Nevertheless, the contents of the instrument items also incorporate the actual views of tourists prior to quantitative surveys. To maximize participants, the questionnaires were designed based on simplicity. In doing so, there do generate certain degree of weaknesses such as losing the detailed dimensions of each of the construct. The questionnaire items were pilot-tested with ten domestic tourists and ten foreign tourists, and the sentences were revised to make them fluency in understanding, while considering avoiding jargon, ambiguity, emotional language, leading questions or any questions that could be beyond the respondents’ capabilities (Neuman, 2006, p. 279).

The simplicity of the contents design ensures fitting the definitions and thus establishes the measurement validity (Neuman, 2006, p. 192), and with proper design practices (Neuman, 2006), measurement reliability is also made possible. Key definitions are: destination’s affective image represents a tourist’s feelings towards a destination (Baloglu and McCleary, 1999), destination’s cognitive image refers to the
beliefs or knowledge a tourist forms of the destinations (Wang and Hsu, 2010, p. 831), and tourist satisfaction is the evaluative responses, for instance, in terms of meeting the expectations (Tan, 2017; 2018a).

The reliability criterion (with Cronbach’s Alpha exceeding 0.70) was met for all the constructs except cultural heritage, which is at 0.657. Thus, cultural heritage has not been able to reveal its significant impact on tourist satisfaction. The reliability test result is shown in Table 1.

Table 1: Reliability Test Result

<table>
<thead>
<tr>
<th>Construct and Measurement Items</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cultural Heritage</strong></td>
<td></td>
</tr>
<tr>
<td>There are many exciting cultural activities present through the destination, practices, values and ways of life.</td>
<td>0.657</td>
</tr>
<tr>
<td>There are many unique temples in the destination.</td>
<td></td>
</tr>
<tr>
<td>There are many unique buildings of heritage value in the destination.</td>
<td></td>
</tr>
<tr>
<td><strong>Place national identity:</strong></td>
<td></td>
</tr>
<tr>
<td>The destination has breathtaking scenery and landscape.</td>
<td>0.787</td>
</tr>
<tr>
<td>The destination is well maintained of the ecological resources which cab be similarly seen across Laos.</td>
<td></td>
</tr>
<tr>
<td>In the destination we can see and learn of the culture of Laos.</td>
<td></td>
</tr>
<tr>
<td><strong>Festival and events:</strong></td>
<td></td>
</tr>
<tr>
<td>There are exciting cultural events organized which the visitors can join in the destination.</td>
<td>0.834</td>
</tr>
<tr>
<td>There are many interesting seasonal activities which the visitors can participate in the destination.</td>
<td></td>
</tr>
<tr>
<td>There are international film festivals which visitors can enjoy in the destination.</td>
<td></td>
</tr>
<tr>
<td><strong>Friendliness:</strong></td>
<td></td>
</tr>
<tr>
<td>Service providers in the destination are friendly.</td>
<td>0.810</td>
</tr>
<tr>
<td>Service providers in the destination are always willing to help.</td>
<td></td>
</tr>
<tr>
<td>The locals are willing to open their local culture to the visitors.</td>
<td></td>
</tr>
<tr>
<td><strong>Relaxing atmosphere:</strong></td>
<td></td>
</tr>
<tr>
<td>The destination trip is very relaxing.</td>
<td>0.814</td>
</tr>
<tr>
<td>The destination trip is not stressing.</td>
<td></td>
</tr>
<tr>
<td>The destination is a place that pleases the heart.</td>
<td></td>
</tr>
<tr>
<td><strong>Tourist satisfaction:</strong></td>
<td></td>
</tr>
<tr>
<td>The experience in the destination was exactly what I expected.</td>
<td>0.884</td>
</tr>
<tr>
<td>My choice of the destination was the wise one.</td>
<td></td>
</tr>
<tr>
<td>I really enjoyed the trip.</td>
<td></td>
</tr>
<tr>
<td>The destination experience was unforgettable one.</td>
<td></td>
</tr>
<tr>
<td>The overall destination experience offered value for the money spent.</td>
<td></td>
</tr>
<tr>
<td><strong>Recommendation:</strong></td>
<td></td>
</tr>
<tr>
<td>I will recommend the destination to others.</td>
<td>0.709</td>
</tr>
<tr>
<td>I will encourage others to experience the destination.</td>
<td></td>
</tr>
<tr>
<td><strong>Revisit intention:</strong></td>
<td></td>
</tr>
<tr>
<td>I will consider visiting the destination in the future.</td>
<td>0.810</td>
</tr>
<tr>
<td>I will make an effort to return to the destination.</td>
<td></td>
</tr>
</tbody>
</table>

In Table 1, cultural heritages, the place national identity and festival and events are attribute domains of the cognitive destination images. Friendliness and relaxing atmosphere are the attributes of the affective destination images. The tourists can visit and experience, for instance, the Laos cultures from many of the unique and serene Buddhist monasteries spreading around the city, i.e. Wat Si Saket, built by the King Anou in 1818.
Results and Discussion: A total of 400 valid responses was collected, spreading equally between Luang Prabang and Vientiane of Lao PDR. The equal or near equal distributions were also found in gender, different age groups, and whether first-time or repeat visitor to Lao PRD, as shown in Table 2. Majority of the visitors responding to the questionnaires were undergraduates of 55.8%, followed by post-graduates at 30%, and 14.2% at secondary high-school educational level.

Table 3: The ANOVA and T-Test Results, and Descriptive Mean

<table>
<thead>
<tr>
<th>Constructs:</th>
<th>Culture</th>
<th>Place National Identity</th>
<th>Festival and Events</th>
<th>Friendliness</th>
<th>Relaxing Atmosphere</th>
<th>Overall image</th>
<th>Tourist Satisfaction</th>
<th>Recommendation</th>
<th>Revisit Intention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.26</td>
<td>4.26</td>
<td>4.18</td>
<td>4.29</td>
<td>4.27</td>
<td>4.96</td>
<td>4.25</td>
<td>4.11</td>
<td>3.92</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>0.58</td>
<td>0.63</td>
<td>0.66</td>
<td>0.63</td>
<td>0.65</td>
<td>0.63</td>
<td>0.62</td>
<td>0.64</td>
<td>0.7</td>
</tr>
<tr>
<td>Frequency / Percentage</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Besides, Table 3 also shows the result of the ANOVA and t-tests of the comparative differences of the influence of different demographic variables etc. on the constructs, which shows no significant differences in any of them. Among the four hypotheses raised in the literature review sections, only H4 fails the supportability test based on regression analysis as shown in Table 3.

Table 3: The Hypothesis Testing Result

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Dependent Variable</th>
<th>$R^2$</th>
<th>Independent Variables</th>
<th>Standardized Coefficient (Beta)</th>
<th>t-value</th>
<th>Sig.</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1, H2</td>
<td>Tourist Satisfaction</td>
<td>0.970</td>
<td>Place National Identity</td>
<td>0.335</td>
<td>8.560</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Festival and Events</td>
<td>0.399</td>
<td>23.243</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Friendliness</td>
<td>0.224</td>
<td>5.447</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Relaxing Atmosphere</td>
<td>0.078</td>
<td>3.197</td>
<td>0.002</td>
<td>Supported</td>
</tr>
<tr>
<td>H3</td>
<td>Recommendation</td>
<td>0.307</td>
<td>Tourist Satisfaction</td>
<td>0.554</td>
<td>13.276</td>
<td>0.000</td>
<td>Supported</td>
</tr>
<tr>
<td>H4</td>
<td>Revisit Intention</td>
<td>0.004</td>
<td>Tourist Satisfaction</td>
<td>0.065</td>
<td>1.309</td>
<td>0.191</td>
<td>Failed</td>
</tr>
</tbody>
</table>

In essence, the tourism industry should continue to strengthen both the cognitive and affective attributes of the destinations offered, with particular emphasis on place national identity, festival and events, and friendliness and relaxing atmosphere. These four attributes contribute significantly to predict 97% variance of tourist satisfaction. Nevertheless, much have to be created and emphasized in order to cause tourists who have had visited to revisit again and to significantly improve their responses in terms of recommending others to visit the country. Further research should use in-depth interviews method to help identify the factors that can cause revisit intentions.

Conclusion and Implications: Three hypotheses (H1 to H3) passed the regression tests except the revisit intention which fails to be predicted by tourist satisfaction. Thus, the empirical structure provides at least three implications which narrates the current states of play of the tourist attitudes and behaviors relating to their experiences in Luang Prabang and Vientiane in Laos. First of all, the stimulus-organism-response (SOR) theory of tourist behaviors (Tan, 2018) is well-suited in understanding how tourist satisfaction is being caused, and furthermore, how tourist satisfaction can induce positive attitude of tourists to provide

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recommendations to potential tourists to visit Laos. Second, the revisit intention scores the lowest mean of the informed tourist perceptions, at 3.9250 (of five Likert Scale, with 3 as neutral and 4 as agreeable with the statement), and standard deviation is also the widest at 0.71. Although recommendation by the visiting tourists to others is possible, they themselves show no interest to revisit. Besides, the recommendation variance can only be explained 30.7% as a result of tourist satisfaction. Unless tourism weaknesses are addressed in Laos, the country would lose to gain the interests of both the existing and potential tourists. According to the Travel & Tourism Competitiveness Report published by the World Economic Forum (2017), Laos ranked 94 globally in terms of tourism and travel competitiveness, falling behind all the members of South-East Asia, with obvious weaknesses in exploiting the nation’s cultural resources and business travels (see Table 4, Figure 2).

Table 4: Lao PDR performance in tourism and travel competitiveness as compared against other members of South-East Asia (Source: World Economic Forum, 2017).

<table>
<thead>
<tr>
<th>Country</th>
<th>Overall Score</th>
<th>Price Competitiveness</th>
<th>Environmental Sustainability</th>
<th>Ground &amp; Port Infrastructure</th>
<th>Tourism Service Infrastructure</th>
<th>Natural Resources</th>
<th>Cultural Resources and Business Travel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Singapore</td>
<td>3.3</td>
<td>3.2</td>
<td>3.1</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Malaysia</td>
<td>3.4</td>
<td>3.2</td>
<td>3.1</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Thailand</td>
<td>3.4</td>
<td>3.2</td>
<td>3.1</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Indonesia</td>
<td>3.4</td>
<td>3.2</td>
<td>3.1</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Vietnam</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Philippines</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>3.4</td>
<td>3.2</td>
<td>3.1</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Cambodia</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.2</td>
</tr>
<tr>
<td>South-East Asia Average</td>
<td>3.2</td>
<td>3.2</td>
<td>3.1</td>
<td>3.0</td>
<td>3.2</td>
<td>3.1</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Figure 2: Competitiveness Elements of Lao PDR’s tourism and travels (Source: World Economic Forum, 2017, p. 212).

Third, although many researchers identify a strong positive linkage between tourist satisfaction and revisit intentions (Tan, 2017), this research provides empirical evidence that it may not be so, unless there are other compelling reasons for taking this cognitive tendency. Further research should use in-depth interviews method to help identify the factors that can cause revisit intentions.

Acknowledgement: The authors would like to extend the gratitude to Mae Fah Luang University for the funding in making this research possible.

References:


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Khamxay Bounmixay and Chai Ching Tan
School of Management, Mae Fah Luang University
E-mail: drcctan@yahoo.com, tan.cha@mfu.ac.th

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RELATIONSHIP BETWEEN NUTRIENT STATUS AND INFESTATION OF SHOT-HOLE BORER ON ROBUSTA COFFEE

AVINASH, REVANNA REVANNAVAR, HANUMANTHARAYA, L., THIPPESHAPPA, G. N, GANAPATHI, M

Abstract: The relationship between nutrient status and infestation of shot-hole borer on robusta coffee was carried out in a heavily infested patch in fertigated and non-fertigated robusta coffee plantation. Among fifty infested and fifty uninfested twigs sampled from the fertigated plantation and non-fertigated plantation, the per cent nitrogen, phosphorous and potassium in the twigs was quantified. The per cent nitrogen was significantly higher (1.714 per cent/twig) in the twigs sampled from fertigated plantation than in the twigs sampled from non-fertigated plantation (1.036 per cent/twig). The per cent phosphorous was significantly higher (0.018 per cent/twig) in the twigs sampled from fertigated plantation than in the twigs sampled from non-fertigated plantation (0.007 per cent/twig). The per cent potassium was significantly higher (0.125 per cent/twig) in the twigs sampled from fertigated plantation than in the twigs sampled from non-fertigated plantation (0.086 per cent/twig). No significant difference for the percent N, P and K was observed between the infested and uninfested twigs obtained from both the plantation. The per cent infestation within fertigated and non-fertigated plantation was found to be 72.14 and 61.42 respectively. The range of infested twigs per infested plant in the fertigated plantation was found to be 1 to 15 infested twigs per plant, whereas it was 1 to 8 infested twigs within the non-fertigated plantation.

Keywords: Xylosandrus Compactus, Robusta Coffee, Infestation, Nutrients, Analysis.
INFLUENCE ON WEATHER PARAMETERS ON INCIDENCE OF SCIOTHRIPS CARDAMOMI RAMK. ON M2 AND M3 VARIETIES OF CARDAMOM

VENUKUMAR, S., HANUMANTHARAYA, L., REVANNA REVANNAVAR., LAKSHMANA, D., SADASHIV NADUKERI., SUCHITHRA KUMARI, M. H.

Abstract: Cardamom thrips, Sciothrips cardamomi Ramk. is one of the important key pest of cardamom in hill and coastal zone of Karnataka. At present cardamom crop is facing many distinct problems apart from the natural calamities such as heavy/low rainfall, resulting in lower yield. So, the present investigations have been conducted to see the seasonal incidence of cardamom thrips on cardamom varieties viz., M2 and M3 (M=Mudigere). The results on cardamom thrips indicated that the peak thrips population per leaf sheath was recorded during the month of February to May on both M2 and M3 varieties of cardamom (2.90 and 2.71 no. per leaf sheath, respectively). Whereas, the highest thrips population per panicle was recorded in the month of September on both M2 and M3 varieties of cardamom (2.63 and 2.53, respectively). The correlation studies indicated that there was a significant positive correlation with temperature and thrips per leaf sheath in M2 (r=0.571) and M3 (r=0.636) varieties of cardamom.

Keywords: Cardamom Thrips, Sciothrips Cardamomi, Temperature, Relative Humidity.

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Venukumar, S.,
Department of Entomology, College of Horticulture, Mudigere.
University of Agricultural and Horticultural Sciences, Shivamogga
E-mail I.D- svenukumar59@gmail.com

Hanumantharaya, L.,
Department of Entomology, College of Horticulture, Mudigere.
University of Agricultural and Horticultural Sciences, Shivamogga

Revanna Revannavar.,
Department of Entomology, College of Horticulture, Mudigere.
University of Agricultural and Horticultural Sciences, Shivamogga

Lakshmana, D.,
Department of Entomology, College of Horticulture, Mudigere.
University of Agricultural and Horticultural Sciences, Shivamogga

Sadashiv Nadukeri.
Department of Entomology, College of Horticulture, Mudigere.
University of Agricultural and Horticultural Sciences, Shivamogga

Suchithra Kumari, M. H.
Department of Entomology, College of Horticulture, Mudigere.
University of Agricultural and Horticultural Sciences, Shivamogga
BEING AN ADOLESCENT ON ANTIRETROVIRAL THERAPY IN ETHEKWINI DISTRICT: KWAZULU-NATAL PROVINCE: SOUTH AFRICA

FARHANA MAHOMED, PROF AH MAVHANDU-MUDZUSI

Abstract: The aim of this study was to gain an in-depth understanding the experiences of using antiretroviral therapy among adolescents in the antiretroviral clinic at the provincial hospital in Ethekwini district in order to make recommendations for enhancing ART adherence among this population. This study followed qualitative approach using a phenomenographic design. Data were collected from fifteen criterion purposively selected participants using semi-structured interviews. Data were analysed thematically using the stages of phenomenographic data analysis. Five superordinate themes emerged from data analysis namely: Disclosure of HIV status, adherence to antiretroviral therapy, the impact of living with HIV while on antiretroviral therapy, knowledge related to HIV and Support. The study revealed that adolescents are faced with many challenges while on antiretroviral therapy. This situation has a negative impact on the lives of these adolescents. Recommendations are put forth to improve disclosure, adherence, the impact of being on ART and living with HIV, knowledge related to HIV and support offered to adolescents on ART the antiretroviral clinic at the provincial hospital in Ethekwini district.

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Farhana Mahomed
University of South Africa, South Africa
Prof AH Mavhandu-Mudzusi
Professor, University of South Africa, South Africa
Species specific differences in oxidative stress response in relation to pollution

Reddy, P.B.

Abstract: Exposure to fishes and other aquatic animals to certain chemical pollutants can induce the production of reactive oxygen species (ROS) with succeeding damage to tissues, macromolecules and modifications in oxidant defense mechanism. The present study was aimed to study species differences in antioxidant enzyme activities of two fishes (Mystus tengara (Ham.) and Puntius sophore (Ham.). Fishes were randomly collected from both upstream and downstream of Chambal River at Nagda (Madhya Pradesh, India) during December 2017. Anti-oxidative enzyme (superoxide dismutase, glutathione reductase, glutathione peroxidase and catalase) activities were determined in liver samples. The intensity of malondialdehyde (MDA) was also measured to find out the severity of hepatic oxidative damage. Results clearly revealed that hepatic superoxide dismutase (SOD), catalase (CAT) and glutathione S-transferase (GST) activities and lipid peroxidation levels were elevated in both fishes of polluted site while glutathione peroxidase (GPx) values were much reduced in both the fishes from polluted site than reference site. We noticed a significant species-specific difference in antioxidant enzyme and TBARS levels in both fishes. Antioxidant enzyme levels were much higher in Mystus tengara when compared to Puntius sophore. Based on results, we can conclude that indiscriminate dumping of these chemicals in the River cause big toxic threat to several non-target organisms, spoil the ecosystems and make more vulnerable human health.

Keywords: Antioxidants, Chambal River, Pollution, Species-Specific Differences.

***

Reddy, P.B.
PG Department of Zoology
Government PG College, Ratlam, M.P. India 457001
reddysirr@gmail.com
DEVELOPMENT OF CYCLOMETALATED IRIDIUM(III) COMPLEX-BASED PROBES FOR DETECTING CANCER BIOMARKER LSD1

DR. EDMOND DIK-LUNG MA

Abstract: Lysine-specific histone demethylase 1 (LSD1), the first discovered histone demethylase, acts on mono- and dimethylated H3K4 through a flavin-dependent mechanism. However, its high expression is associated with several types of malignant tumors. Therefore, the probes for LSD1 may serve as a useful screening tool to early diagnosis of cancer patients. Although various traditional analytical methods have been employed to measure LSD1 demethylase activity including coupled enzyme assays, radiolabeled assays, antibody-based assays, mass spectrometry-based assays, these methods are suffering from low feasibility, high cost, low quantitative robustness, technically demanding, and low compatibility to live cells and organisms. In this work, we incorporated a known LSD1 inhibitor TCP into iridium complex scaffold. These complexes are expected to selectively bind to LSD1 in cancer cells. Due to low expression in normal cells, these probes enable discrimination of cancer cells from normal cells. Our initial data shows that these probes can selectively light up the human cervical cancer HeLa cell line. Further investigations are undergoing in our laboratory.

***

Dr. Edmond Dik-Lung Ma  
Associate Professor,  
Hong Kong Baptist University, Hong Kong
Abstract: Biodiversity is the variability among living organisms and the ecological complexes of which they are part, including diversity within species, between species and of ecosystems. At the simplest level, the components of biodiversity comprise many natural resources essential for human development including food, fibre, fuel, and medicinal plants. The primary cause of loss of biodiversity is habitat loss or destruction which is resulted due to the large industrial and commercial activities associated with agriculture, irrigation, construction of dams, mining, fishing etc. The extinction rate has also risen sharply. And this loss of species is not confined to wild animals and plants. The loss of biodiversity directly influences the social life of the country possibly through influencing ecosystem functions (energy flow and biogeochemical cycle). This be easily understood by observing detrimental effects of global warming and acid rain which cause an unfavourable alteration in logical processes. Biodiversity is an integral part of sustainable development hence should not be considered in isolation and managed in conjunction with other issues, such as social and economic considerations, pollution and health. Biodiversity is considered an essential prerequisite for ecosystems to remain intact and fully functioning. As the natural habitats of humans, animals and plants, these ecosystems form the very basis for our existence. It is therefore essential to protect biodiversity for the sake of the economic, social and cultural development of present and future generations.

Keywords: Biodiversity, Sustainable Development, Protection, Loss.
INCREASING SEISMIC VULNERABILITIES FOR NORTHEAST INDIA AND THE BENGAL BASIN DUE TO GROUND WATER DEPLETION

DR. TRIDIB BANDOPADHYAY

Abstract: Earthquake is caused by tectonic activity deep inside the crust resulting in shaking of ground and large-scale devastation from fault-rupture in any direction away from the epicenter and soil stratification. Seismic hazards result in slope instability, ground collapse or subsidence, liquefaction of soil base, structural destruction, tsunami etc. in the near or far-fields along line of propagation of faults. Seismic vulnerability analysis defines the damage prognosis in the light of potentiality of an earthquake in seismically active locations. While an earthquake at any region cannot be avoided being a natural phenomenon, the anthropogenic environmental impacts can advance the clock and increase the possibility of far major devastations from the quake. This present study, based on secondary data, tries to find the potential vulnerabilities of unrestricted groundwater extraction and enhancement of impulses in the identified fault-lines traversing from the Northeast of India to the Bengal Basin or the vice versa.

Geographical convergence of Indian and Eurasian plates developed the sub-Himalayan mountainous topography, which is very young and still in the process of consolidation. Model studies of earthquakes at this collision-plate boundary identify, this convergence is accommodated on the Main Himalayan Thrust Front. Bureau of Indian Standards marked the Indian landmass into three tectonic provinces, viz. Himalayan region, Indo-Gangetic basin and Peninsular India and shown high seismic hazard in most parts of the Northeast and the Bengal Basin. Four seismic zones are designated as II, III, IV and V. While the region close to the Bay of Bengal is placed under Zone III, most parts of the northeast of Indian region is placed in zone V, at the highest level of seismic potential in Seismic Zonation Map of India. The last major quake of April, 2015 at Gorkha near Kathmandu (Nepal) did not generate high-frequency waves and unzipped only a small part of locked energy from lower edge of the Main Himalayan Thrust Front. The Western Nepal and areas under north and northeast of India – extending up to Bengal Basin thus remained under potentially increased risk of any major quakes in future. Alternatively, the quakes extending from Sumatran Subduction Trench along Lesser Sunda Islands also have the potential to extend seismic impulse through Eocene Hinge Zone from Bengal Basin to the Northeast of India. The seismic vulnerabilities for this geographical region can be thus anticipated from any of these two directions. Geological and geophysical studies indicate seismic activity in these divergent margins with NE-SW orientation. Study of seismicity and fault planes of past earthquakes in Bengal Basin also focuses on deformations of the northern Indian plate.

The Gangetic delta region is formed by sedimentary alluvial deposits of Brahmaputra–Ganga–Barak river systems. Soil deposits are soft, erratic and geomorphologically divided into fluvial plain, tidal flat, natural levee and fed by numerous channels. The soil stratum covers alternate layers of clay, silt and sand horizons not fully consolidated. Studies of last earthquake of Gorkha (Nepal, 2015) showed major contribution of groundwater extraction for advancement of the devastations. Enormous extraction of ground water, far exceeding the recharge potential, creates formation of void space below overburden soil-stratum in the entire Northeast and the Bengal Basin. Confined groundwater is increasingly under pressure due to weight of the overburden and also further pressed by piling of deep columns for high-rise concrete structures for developmental activities. The overburden pressure is increasing below that region. Due to over-extraction, water-level of underlying aquifers vis-à-vis pore–water pressure is depressing year after year. This anthropogenic environmental impact of groundwater depletion is likely to advance the potential for seismic impulse and enhance scale of devastations of an earthquake episode, act as catalysts for large-scale soil liquefaction and structural dislocations.

Keywords: Himalayan Thrust Front, Eocene Hinge Zone, Sumatran Subduction Trench, Soil Liquefaction

Dr. Tridib Bandopadhyay
Scientific and Environmental Research Institute, Kolkata
POLLUTION LOAD IN RIVER GANGA FROM BANDEL TO KOLKATA AND ITS SOCIO ECONOMIC IMPACTS

DR. MANIK CHANDRA KARMAKAR, DR. ARNESHA GUHA

Abstract: With the growth of population in Bandel to Kolkata region the quantity of waste water is also increasing in addition to the production of large quantities of sewage. Sewage contains decomposable organic matter and exert an oxygen demand on the receiving waters. Industrial activities generate a wide variety of waste products, which are normally discharged into water courses. Major contributors are the pulp and paper, chemicals, agro-based, soda water, cotton textiles, jute and jute based, leather, chemical and rubber industry and all of them discharge their waste water and other effluents, directly or indirectly, into the river, resulting in the pollution to such an extent that is causing health hazards and other problems. Hepatitis, cholera, dysentery and typhoid are the common waterborne diseases, which has affected the inhabitants of this region. Apart from diarrhoea, and breathing problems, drinking polluted water has lead to skin diseases. The polluted water has become breeding grounds for mosquitoes and many other parasites. The research paper is a genuine endeavour to explore the pollution load in river Ganga from Bandel to Kolkata and analyse its socio economic impacts.

Keywords: Pollution, Impacts, Ganga, Socio-Economic.
CRITICAL ESTIMATION OF NUTRIENTS IN THE SOILS FOR CULTIVATION OF SUNDARI TREES IN DIFFERENT REGIONS OF INDIAN SUNDARBANS

DR. DIPANKAR BANDYOPADHYAY

Abstract: The Indian Sundarbans is low flat alluvial plains covered with mangrove swamps which are intersected by a number of tidal rivers like Hugli, Matla, Saptamukhi, Thakuran, Raimangal and Ichamati. River Hugli receives huge freshwater and nutrients from Ganga, while the others do not receive such freshwater. In general, the soils of the Sundarbans are derivatives of fine Gangetic deltaic alluvium born out of terrestrial materials of the Himalayas. But the entire coastal strip of India including the Sundarban delta contains mostly saline soil. So, moderately high salinity, calcium, magnesium, potassium, sulphur, sodium and sulphate contents are observed in the different estuarine regions of Sundarbans. Soils have low to medium organic carbon, nitrogen and available phosphorus nutrient contents. The texture of soils has silty clay-loam. Sundarban estuaries are generally free from aquatic pollution. The Sundarbans has extremely rich halophytic vegetation which is known as Mangroves and encompasses a variety of plants including trees, shrubs, grasses, epiphytes, and lianas. The prominent species is ‘Sundari’ (Heritiera fomes). The name ‘Sundarbans’ is perhaps derived from the meaning of “forest of sundari trees” which is substantively found here. The flora of this forest has been facing tremendous exploitation. Over the years, the stock of Sundari trees in the region has got depleted. Sundari, being valuable timber, has been over-exploited in the past. The greater part of the inner estuarine zone has become more saline due to lack of fresh water and the Sundari, which prefer less saline soil, do not proliferate these days. This situation has geometrically been deteriorating the soil potential with high incidence of salinity and spread of uncultivated land. An attempt has been made to estimate nutrients in soil to reverse this trend and cultivate Sundari trees to protect the Sundarbans.

Keywords: Indian Sundarbans, Mangrove swamps, Mangroves, Saline soil, Nutrient.

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Dr. Dipankar Bandyopadhyay
Shibpur Dinobundhoo Institution (Main),
Howrah, West Bengal
ECOFEMINISM: WOMEN’S VOICES FOR THE EARTH

DR. ARNESHA GUHA

Abstract: Ecofeminism is an environmental movement, born from the necessity to give the possibility to women to have an active participation in ecological issues. Ecofeminism emerged in the 1970s with an increasing consciousness of the connections between women and nature. Ecofeminism puts forth the idea that life in nature is maintained through cooperation, mutual care and love. It is an activist and academic movement, and its primary aim is to address and eliminate all forms of domination while recognizing and embracing the interdependence and connection humans have with the earth.

The Indian environmental movement represents a wide spectrum of social conflicts over dwindling natural resources. It has grown rapidly over the past two decades and represents conflicts localized within villages or spread across large areas involving large number of people. Women nowadays are participating equally with men in all fields. They are ahead of men particularly in the matter of prevention of pollution and protection, preservation, and conservation of environment. The origin of ecofeminism in India undisputedly remains the Chipko or Tree hugging movement of the 1970’s. The movement had spread across many villages in the Garhwal region of what is now the state of Uttaranchal in Northern India. Though women are actively taking part in the protection of environment, their participation in the formulation, planning, and execution of environmental policies still remains low. No environmental program can achieve success without the involvement of women. Without their full participation, sustainable development cannot be achieved. The research paper is a genuine attempt to analyse the status of ecofeminism in India and its impact on the society.

Keywords: Environmental Movement, Women, Conservation, Nature.

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Dr. Arnesha Guha
Scientific and Environmental Research Institute, Kolkata
ETHNOBOTANICAL KNOWLEDGE OF SANTAL TRIBES OF WEST BENGAL

DR. ARNESHA GUHA, DR. TANMOY RUDRA

Abstract: Ethnobotany is defined as the study of the relationship between people and plants and most commonly refers to the study of indigenous uses of plants. People have always depended on plants for their primary needs, (food, shelter, medicines, etc.), and thus naturally have learned their uses. In the course of nomadic roaming this knowledge was exchanged with neighbouring tribes, friends and foe and was gradually expanded upon. Thus, plant knowledge has been passed around the world since the beginning of time - and frequently the actual plants themselves have spread along with it.

The word ‘Santal’ is derived from two words; “santa” meaning calm and peaceful and “ala” meaning man. They reside in the vicinity of forest and use various plant parts as food, medicines, and in many other purposes for their daily livelihood. They have ethnic knowledge about ambient vegetation around their dwelling areas. Medicinal plants have a long-standing history in Santal communities, and are an integral part for treating various diseases, particularly to curve daily ailments and this practice of traditional medicine is based on hundreds of years of belief and observations. Due to environmental degradation many plants have become extinct and others are on the verge of extinction.

Special awareness and training programme should be arranged for the use of these medicinal plants along with the development of the tribal communities who are the pioneer of this type of work, measures should be taken to preserve their valuable, ethnobotanical knowledge before its extinction forever.

Keywords: Santal Tribes, Ethnobotanical Knowledge, Preserve, Extinction.

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Dr. Arnesha Guha
Scientific and Environmental Research Institute, Kolkata

Dr. Tanmoy Rudra
Scientific and Environmental Research Institute, Kolkata
UV-B INDUCED BIOCHEMICAL CHANGES ON CYANOBACTERIA OF ODISHA COAST

DR. BISWAJIT RATH

Abstract: The aim of the study was to determine the impact of exposures to UV-B radiation (320-280 nm) for different time interval (10-40 min) on the growth, pigment and protein biosynthesis by the cells of the two cyanobacteria (Lyngbya majuscule and Lyngbya chaetomorphae) isolated from Chandipur coast, Balasore, Odisha. Cultures were exposed to UV-B radiation at intensities of 5 Wm-2 for 10-40 min. The growth, pigment and protein content was estimated following standard procedure. Both the species showed differential response to UV-B radiation. Lyngbya majuscule can withstand higher exposure period of radiation as compared to Lyngbya chaetomorphae. The recovery study after UV exposure in normal culture condition was found to be insignificant on higher exposure time. Among both the species Lyngbya majuscule found to recover better than Lyngbya chaetomorphae on exposure to UV radiation for different time.

Keywords: Cyanobacteria, Ultraviolet Radiation, Chlorophyll, Protein, Recovery.
DIVERSITY AND FEEDING BEHAVIOUR OF BIRDS IN AND AROUND BHASKEL AND SILATI DAM RESERVOIRS OF DANDAKARANYA, NABARANGPUR DISTRICT OF ODISHA, INDIA

DR. HEMANTA KUMAR SAHU, PRAMOD PAL, SUBHRAKANTA JENA

Abstract: The biodiversity, in wild and domesticated forms, is the source for most of humanity, food, medicine, clothing and housing, much of the cultural diversity and most of the intellectual and spiritual inspiration. For most of the time, man lived in a hunter-gatherer society and thus depended entirely on biodiversity for sustenance. But, with the increased dependence on agriculture and industrialization, the emphasis on biodiversity has decreased leads to serious risk of existence over the next two to three decades. On realization that the erosion of biodiversity may threaten the very existence of life has awakened man to take steps to conserve it. As we, all know birds are the glorified reptiles and master of air and serve as a biological indicator in the nature, so any variation in avifaunal diversity can put a serious impact on ecosystem as well as in the nature. In regards to the above circumstances, an initiative study has been taken into consideration, which focused on bird diversity and its feeding behavior in Bhaskel and Silati dam of Dandakaranya of Nabarangpur district of Odisha state of India. The study was carried out during August, 2016 to April, 2017. Frequent sampling was madethroughout this period in both the study areas through direct sighting, nest counting and transect line method to record birds in both day and nighttime. The birds were identified and classifiedbased on standard field guides by Ali and Ripley (1987), Ali (2002). The birds’ checklist was prepared using standardized common and scientific names by Manakadan and Pittie (2001). As a result, we found 3,633 no of birds belonging to 150 species, 115 genera, 56 families and 19 orders were recorded during the study period. Of the total birds, 134 (89.33%) species were resident (R) and 16 (10.66%) species were migratory (M). Dietary pattern of birds showed that insectivores 36.66% (n=55) were dominating bird community followed by Piscivores 14% (n=21), omnivores 12% (n=18), carnivores 12% (n=18), frugivores 11.33% (n=17), granivores 8.66% (n=13) and nectarivores 4.66% (n=7) respectively. Shanon-Weiner’s and Simpson’s diversity indices were calculated to measure the avifaunal diversity. The Shanon-Weiner’s diversity index was found to be 4.724 and the Simpson’s diversity index was found to be 0.99 which signifies a good avifaunal diversity in the study area. To conclude it may be noted that only a few selected patches of forests were studied in a shorter time spans, a more intensive study needs to look up the impact of anthropogenic alteration in this area.

Keywords: Diversity, Feeding Behavior, Birds, Bhaskel And Silati Dam Reservoirs Of Dandakaranya, Nabarangpur, Odisha.

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Dr. Hemanta Kumar Sahu,
Professor in Zoology, P.G. Department of Zoology, North Orissa University,
Takatpur, Baripada, Mayurbhanj-757003, Odisha, India

Pramod Pal
M.Phil. Student, P.G. Department of Zoology, North Orissa University,
Takatpur, Baripada, Mayurbhanj-757003, Odisha, India

Subhrakanta Jena
Ph.D. Scholar, P.G. Department of Zoology, North Orissa University,
Takatpur, Baripada, Mayurbhanj-757003, Odisha, India
ANTIBIOTIC RESISTANCE PROFILES OF SALMONELLA ISOLATED FROM DIFFERENT CHICKEN MEAT STALLS AT A WET MARKET IN THAILAND

BUSSARA SRIPAURYA, RUTTAYAPORN NGASAMAN, SOOTTAWAT BENJAKUL, KITIYA VONGKAMJAN

Abstract: Salmonella contamination is a common issue found in chicken meat and other meat products. This foodborne pathogen can survive in various sites in wet markets, especially food contact surfaces. Inadequate cleaning can lead to cross-contamination of this foodborne pathogen with a potential of antibiotic resistant ability in food sold at the wet markets. Ninety-four samples collected from chicken meat (36 samples) and food contact surfaces (58 samples) from three chicken meat stalls, Salmonella was detected in 35 samples (37.2%), of which 19 (57.6%), 8 (23.5%) and 8 (29.6%) samples were from stall A, B, and C, respectively. Chicken meat samples from stall A, B and C showed 66.7%, 50%, and 25%, and food contact surface samples from stall A, B, and C showed 52.4%, 9.1% and 33.3% of samples positive for Salmonella spp., respectively. Fifty-six of the selected Salmonella isolates were characterized for antibiotic resistance, most isolates (38 isolates) showed resistance to tetracycline, followed by ampicillin (26 isolates) and none observed resistance to ceftriaxone. Overall, 21 isolates have been observed as multidrug resistance (MDR), represented by 12 resistant profiles. This study suggests the possible vehicles that may facilitate Salmonella transmission between chicken meat and food contact surfaces or vice versa at a wet market. This is considered a serious public health concern as multiple MDR profiles have been observed in this study.

Keywords: Salmonella spp., Chicken meat stalls, Antibiotic resistance, Wet market

Introduction: Salmonella spp. is a bacterial pathogen that can cause foodborne illness worldwide. Salmonella contamination is commonly found in retail meats, including beef, lamb, and pork [27]. Especially, chicken meat is one of the most common vehicles for Salmonella transmission and infection in many countries [11]. It can be transmitted into the body by eating food contaminated with Salmonella. Antibiotic resistance is a worldwide serious issue as it is difficult to treat which can then result in severe illness and death. Multidrug resistant (MDR) Salmonella is also a major issue and often associated with food and other sources, leading to about 100,000 illnesses each year [1]. According to the National Institute of Health, Department of Medical Sciences, the estimated antibiotic resistant infections each year are more than 100,000 people in Thailand [14].

Salmonella can be often found on chicken carcasses and other processed chicken products [16]. Salmonella can transfer and reside in various sites in wet markets and can then lead to cross-contamination in food during selling through food contact surfaces or equipment [17]. Food contact surfaces such as working tables and equipment in retail processing could also be a source of Salmonella [20]. The emergence and transmission of MDR Salmonella suggest a serious health issue and particularly when found related to chicken meat and retail environments where meat is processed and sold. It is important for us to conduct this study to determine the distribution of Salmonella in chicken meat stalls at a wet market in Thailand. Salmonella isolates from a wet market were then investigated for antibiotic resistant ability. Data from this study can suggest the association of antibiotic resistance and Salmonella in retail level which can then increase a risk for spreading to consumers in Thailand.

Material and Methods:
Locations of Chicken Meat Stalls and Sample Collection: Three chicken meat stalls (A, B and C) located at a wet market in the city of Hat Yai, Songkhla Province, Thailand were included in this study. Ninety-four samples from chicken meat (including breast, drumstick and thigh) and food contact surface were collected during March 2016 to December 2016. All samples were collected at the end of a selling day before store closing.

Chicken Meat Samples: For a given stall, two sampling visits were conducted for the collection of 12 raw chicken meat samples (breast, drumstick, and thigh). A total of 6 pieces were randomly collected from
each stall. All raw chicken meat samples were kept in sterile bags and placed in an ice box (4°C) during the transportation to the laboratory and analysis within 12 h after sampling.

**Food Contact Surface Samples:** Food contact surface samples were collected during at least two sampling visits. An additional sampling visit (3rd visit) was included to stalls A and C. At least two samples were collected for the same surface area. Food contact surfaces (FCS) swabs were randomly collected from surfaces of buckets, cutting boards, knives, trays, scales, and working table of each stall; 21 samples from stall A, 22 samples from stall B, and 15 samples from stall C. FCS samples were swabbed by using sterile cotton swab. Cotton swabs were placed back in sterile tubes containing 10 ml of buffered peptone water (BPW). All FCS samples were kept in sterile bags and placed on ice in an ice box (4°C) during the transportation to the laboratory for analysis within 12 h after sampling.

**Salmonella Isolation and Confirmation:** Detection of *Salmonella* spp. was performed according to a standard protocol of ISO 6579:2002 with slight modifications [8]. Approximately 25 g from chicken meat sample containing 225 ml of Buffered peptone water (BPW). For FCS sample, 90 ml of BPW was added to each collected swab [24]. After stomaching, the homogenate was incubated at 37 °C for 18 h. Aliquot, 0.1 ml and 1 ml were aseptically transferred 10 ml of Rappaport-Varsiliadis broth with soya (RVS) and Muller-Kauffmann Tetrathionate-novobiocin broth (MKTTn), and incubated at 41.5 °C for 24 h, and 37 °C for 24 h, respectively. A loopful of samples from RVS and MKTTn was cultured onto two selective agars, Xylose Lysine Desoxycholate (XLD) and Hektoen Enteric (HE), and incubated at 37 °C for 24 h. Up to four presumptive colonies from XLD and/or HE were confirmed by biochemical tests, followed by PCR using invA gene (678 bp) [9]. DNA templates for PCR were prepared by using the GF-1 Bacterial DNA Extraction kit (Vivantis, CA, USA) following the manufacturer’s instructions. *Salmonella* isolates were kept in 15% glycerol at -80 °C for further analysis.

**Identification of Antibiotic Resistance Profile in Salmonella Isolates:** Antibiotic resistance profile was screened by a standard agar disk diffusion method on Mueller-Hinton agar plates, as described by the Clinical and Laboratory Standard Institute [2]. Sixty-six *Salmonella* isolates of which at least two isolates from each positive samples were followed on nine antibiotics (Oxoid, UK): ampicillin (AMP, 10 µg), chloramphenicol (C, 30 µg), streptomycin (S, 10 µg), trimethoprim-sulfamethoxazole (SXT, 1.25/23.75 µg), tetracycline (TE, 30 µg), gentamicin (CN, 10 µg), nalidixic acid (NA, 30 µg), ciprofloxacin (CIP, 5 µg) and ceftriaxone (CRO, 30 µg). *Escherichia coli* (ATCC 25922) was used as a control strain. Results were compared to the standard width of each drug under the table zone diameter interpretive standards and scored as sensitive, intermediate, and resistant according to CLSI guidelines (CLSI, 2015). Two independent replicates were performed.

**Results:**

**Occurrence of Salmonella spp. Found in Chicken Meat Stalls At A Wet Market:** Of 94 samples collected from three chicken meat stalls at a wet market, 35 samples (37.2%) were positive for *Salmonella* spp. (Table 1). Differences in *Salmonella*-positive samples were detected among stalls, i.e., 19 (n = 33; 57.6%), 8 (n = 34; 23.5%) and 8 (n = 27; 29.6%) samples in stall A, B and C, respectively.

Chicken meat samples from stall A, B and C showed 66.7%, 50%, and 25%, and food contact surface samples from stall A, B and C showed 52.4%, 9.1% and 33.3% of samples positive for *Salmonella* spp., respectively. Among samples from these three stalls, the most frequent occurrence of *Salmonella* spp. in chicken meat and FCS samples were observed in stall A, while less occurrence was observed in chicken meat and FCS samples of stall C and B.
**Table 1:** Distribution of *Salmonella* spp. in Chicken Meat Stalls At A Wet Market.

<table>
<thead>
<tr>
<th>Chicken meat stall</th>
<th>Sampling visit</th>
<th>No. of positive / No. of collected samples (%)</th>
<th>Chicken meat</th>
<th>Food contact surface</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stall A 1</td>
<td>1</td>
<td>4/6</td>
<td>5/5</td>
<td>9/11 (81.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>4/6</td>
<td>5/10</td>
<td>9/16 (56.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>nc</td>
<td>1/6</td>
<td>1/6 (16.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>8/12 (66.7)</td>
<td>11/21 (52.4)</td>
<td>19/33 (57.6)</td>
<td></td>
</tr>
<tr>
<td>Stall A 2</td>
<td>1</td>
<td>5/6</td>
<td>1/10</td>
<td>6/16 (37.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1/6</td>
<td>1/12</td>
<td>2/18 (11.1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6/12 (50.0)</td>
<td>2/22 (9.1)</td>
<td>8/34 (23.5)</td>
<td></td>
</tr>
<tr>
<td>Stall A 3</td>
<td>1</td>
<td>2/6</td>
<td>4/5</td>
<td>6/11 (54.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1/6</td>
<td>1/8</td>
<td>2/14 (14.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>nc</td>
<td>0/2</td>
<td>0/2 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3/12 (25.0)</td>
<td>5/15 (33.3)</td>
<td>8/27 (29.6)</td>
<td></td>
</tr>
</tbody>
</table>

**Antibiotic Resistance Profiles:** Among 56 *Salmonella* isolates tested, 10 isolates were susceptible to all nine antibiotics whereas other 50 isolates showed resistant to a single antibiotic or multiple antibiotics (up to 6) (Table 2). *Salmonella* isolates from a given stall showed 10, 5, and 9 antibiotic profiles for stall A, B, and C, respectively.

The most common antibiotic resistance of *Salmonella* isolates was tetracycline (40 isolates), followed by ampicillin (28 isolates) (Fig. 1). Only a few isolates (chicken meat isolate from stall B and FCS isolate from stall C) showed resistance to gentamicin. However, all *Salmonella* isolates were susceptible to ceftriaxone. These profiles provide evidence for multidrug resistance (MDR) as indicated by the resistance of 22 isolates to at least three antibiotics which were presented as 13 profiles (g to s).

**Table 2:** Distribution Of Antibiotic Resistance Profiles of *Salmonella* Isolates from Chicken Meat and Food Contact Surface Samples.

<table>
<thead>
<tr>
<th>Antibiotic resistance Profile</th>
<th>No. of isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stall A</td>
</tr>
<tr>
<td></td>
<td>Visit 1</td>
</tr>
<tr>
<td>a (TE only)</td>
<td>6</td>
</tr>
<tr>
<td>b (AMP only)</td>
<td>2</td>
</tr>
<tr>
<td>c (AMP-TE)</td>
<td>2</td>
</tr>
<tr>
<td>d (AMP-SXT)</td>
<td>-</td>
</tr>
<tr>
<td>e (TE-C)</td>
<td>1</td>
</tr>
<tr>
<td>f (TE-SXT)</td>
<td>1</td>
</tr>
<tr>
<td>g (AMP-CIP-NA)</td>
<td>-</td>
</tr>
<tr>
<td>h (AMP-CIP-TE)</td>
<td>-</td>
</tr>
<tr>
<td>i (AMP-TE-NA)</td>
<td>-</td>
</tr>
<tr>
<td>j (AMP-TE-SXT)</td>
<td>-</td>
</tr>
<tr>
<td>k (AMP-CIP-TE-NA)</td>
<td>1</td>
</tr>
<tr>
<td>l (AMP-TE-NA-C)</td>
<td>-</td>
</tr>
<tr>
<td>m (AMP-TE-SXT-C)</td>
<td>-</td>
</tr>
<tr>
<td>n (AMP-NA-SXT-C)</td>
<td>-</td>
</tr>
<tr>
<td>o (S-AMP-TE-SXT)</td>
<td>-</td>
</tr>
<tr>
<td>p (S-AMP-TE-NA-SXT)</td>
<td>-</td>
</tr>
<tr>
<td>q (S-AMP-TE-SXT-C)</td>
<td>-</td>
</tr>
<tr>
<td>r (S-CN-AMP-CIP-TE-NA)</td>
<td>-</td>
</tr>
<tr>
<td>s (S-CN-AMP-NA-SXT-C)</td>
<td>-</td>
</tr>
<tr>
<td>t (Susceptible to all 9 antibiotics)</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
</tr>
</tbody>
</table>
Descriptions of antibiotic resistance profiles: (a) TE only; (b) AMP only; (c) AMP-TE; (d) AMP-SXT; (e) TE-C; (f) TE-SXT; (g) AMP-CIP-NA; (h) AMP-CIP-TE; (i) AMP-TE-NA; (j) AMP-TE-SXT; (k) AMP-CIP-TE-NA; (l) AMP-TE-NA-C; (m) AMP-TE-SXT-C; (n) AMP-NA-SXT-C; (o); (p); (q) S-AMP-TE-SXT-C; (r) S-CN-AMP-CIP-TE-NA; (s) S-CN-AMP-NA-SXT-C; (t) Susceptible to all 9 antibiotics.

Figure 1. Antibiotic resistant frequency of *Salmonella* isolates from different sources. Antibiotics tested: AMP – ampicillin; C – chloramphenicol; S – streptomycin; SXT – trimethoprim-sulfamethoxazole; TE – tetracycline; CN – gentamicin; NA – nalidixic acid; CIP – ciprofloxacin. Sources of isolates: Food (chicken meat), FCS (food contact surfaces).

The most common MDR profile (profile 0) found in 5 isolates among chicken meat samples in all stalls, indicated resistance to S-AMP-TE-SXT. For isolates from a given stall, specific MDR profiles were observed. Three MDR profiles (j, m, and n) were specifically found in only FCS isolates from stall A. Two MDR profiles (p and r) were specific to either chicken meat or FCS isolate from stall B only. Five MDR profiles (g, h, i, l, and s) were specific to isolates only from stall C. In addition, profile a (resistance to TE only) was found in isolates from multiple visits to all stalls while profile f (resistance to TE-SXT) showed to be consistently found in chicken meat or FCS isolates from all three visits to stall A.

**Discussions:** This study investigated the distribution of *Salmonella* spp. in chicken meat, and food contact surface samples in different chicken meat stalls at a wet market in Hat Yai, Songkhla province, Thailand. Antibiotic resistance profiles were investigated among *Salmonella* isolates obtained. Overall, samples from three stalls showed 37.2% positive for *Salmonella*. The most *Salmonella*-positive samples were chicken meat (25% to 66.7%) and FCS (9.1% to 52.4%) samples from all three stalls. Typically, *Salmonella* was found in raw chicken meat, including carcasses, wings, and liver [12], [7]. In Thailand, a previous study reported that raw chicken meat from wet markets was frequently contaminated with *Salmonella* up to 67.5% of samples tested [10].

The distribution of *Salmonella* in chicken meat at retail markets in some countries in South East Asia has been reported with the rate of 47.5% in Malaysia [23] and 42.91% in Vietnam [22]. However, over 80% of food and environmental samples collected from a wet market in Malaysia has also been reported [16]. Other regions such as in EU countries, the distribution of *Salmonella* in fresh broiler meat at retail markets was 7.4% [5]. In the US, a previous report indicated 8.3% of broiler carcasses and 22.9% of ground chicken meat were contaminated with *Salmonella* [25]. Findings from this study and a previous study suggest both food and environments of retail operation (wet market) as important sources of *Salmonella*.

The Occurrence of *Salmonella* was commonly linked to environmental samples, especially FCS, including cutting board, knives, and other containers, which could indicate improper cleaning. It is possible that inadequate cleaning would link to more *Salmonella*-positive samples in stall A (in every sampling visit) than other stalls as observed. In all three stalls, *Salmonella* was often detected on working tables and
scales, suggesting important food contact equipment that could be common sources of *Salmonella*. However, in some study, scales were not a major source of *Salmonella* contamination [16]. Generally, *Salmonella* that survives on chicken carcasses could be transferred onto working tables or scales if carcasses were not washed and/or cleaned properly. An evidence of *Salmonella* transmission in broiler chicken supply chain was reported by [4] as the same PFGE patterns were found among the majority of isolates from adult broiler, pre- and post- cleaning carcasses, carcasses after chilling, and retail chicken. *Salmonella* spp. found in retails could link to cross-contamination at various stages, including slaughtering, processing, and storage at retails [19].

In this study, antibiotic resistance profiles, including non-MDR and MDR were observed, suggesting widely distributed of *Salmonella* isolates with diverse phenotypic characteristics in chicken meat stalls. This could link to a residue from an inapropriate use of particular antibiotics in poultry farms [26]. The presence of MDR isolates in meat may cause serious health issue once the isolates get transferred from food or equipment to humans. The transfer of resistance genes in MDR isolates via horizontal gene transfer to humans may occur and lead to resistant infections [13]. In this study, chicken meats from all three stalls yielded isolates presenting a major MDR profile (profile o; resistance to S-AMP-TE-SXT). This profile is similar to that MDR profile reported among *Salmonella* isolates from retail meats (chicken, beef, and pork) in Hanoi, Vietnam [15] This finding may suggest a common MDR profile among *Salmonella* associated with poultry meat and poultry retail processing in Thailand and Vietnam. In addition, certain MDR profiles were found to be specific to isolates from each stall, indicating the presence of MDR profile that is source specific in this study. A particular profile was consistently shown in chicken meat or FCS isolates from all three visits to stall A, suggesting a profile that was common among isolates from this stall over time. As in [3] reported 44.3% of *Salmonella* isolates collected from poultry carcasses and their environment such as a bucket, cutting board, knives, etc. Those isolates were resistant to multiple antibiotics and of which 50.6% were MDR.

Overall, *Salmonella* isolates from all stalls and sources showed resistance to tetracycline and ampicillin. Interestingly, high resistance rate to these two and sulfonamides was also found in *Salmonella* from animals and foods of animal origin in Thailand, Malaysia, and Vietnam [26]. The increasing trend of using tetracycline in food animal production could attribute to the occurrence of *Salmonella* resistance to this group of antibiotics [18], [21]. *Salmonella* isolates from retail chicken meats in China also showed high resistance to tetracycline [6].

**Conclusion:** *Salmonella* is commonly found in chicken meat and several environmental surfaces/sites (food contact) at a wet market in Thailand, suggesting potential sources of *Salmonella* that could be found in meat sold to customers. *Salmonella* could be of a public health concern as multiple profiles of multidrug resistance were observed in this study. Hygienic practices in wet market vary by locations, improved routine sanitation and cleaning monitoring can thus reduce the occurrence of *Salmonella* contamination in food and environments in a wet market.

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**References:**


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Bussara Sripaurya  
Department of Food Technology, Faculty of Agro-Industry, Prince of Songkla University, Hat Yai, 90112, Thailand  
Ruttayaporn Ngasaman  
Faculty of Veterinary Science, Prince of Songkla University, Hat Yai, 90112, Thailand  
Soottawat Benjakul  
Department of Food Technology, Faculty of Agro-Industry, Prince of Songkla University, Hat Yai, 90112, Thailand  
Kitiya Vongkamjan  
Department of Food Technology, Faculty of Agro-Industry, Prince of Songkla University, Hat Yai, 90112, Thailand
BIOACTIVE SUBSTANCES FROM ENTOMOPATHOGENIC FUNGI, OPHIOCORDYCEPS IN DOI INTHANON NATIONAL PARK, THAILAND

RUNGKIAT KAWPET, KANUNGRAT KUMMANEE, SAMAPORN SAENGYOT

Abstract: Bioactive substances of entomopathogenic fungi Ophiocordyceps (Hypocreales: Ophiocordycipitaceae) found in Doi Inthanon National Park, Chiang Mai (UTM coordinates; 2063808 N, 436635 E at an altitude of 756-2,560 m above mean sea level were investigated. Results showed that the most commonly found substance was cordycepin at 440.65 mg/100 g in Ophiocordyceps nutans with 306.41 and 230.86 mg/100 g in O. sphecocephala and O. irangiensis, respectively. Highest adenosine content was found in O. irangiensis at 13.80 mg/100g, followed by O. nutans at 5.90 mg/100 g.

Keywords: Bioactive Substances, Entomopathogenic Fungi, Pharmaceutical Substances.

Introduction: There are over 400 types of entomopathogenic fungi in Thailand including fungi of the insect-pathogenising genus Ophiocordyceps. Many types of Ophiocordyceps spp. are believed to have medical and pharmaceutical benefits. Previous reports described medicinal properties of Ophiocordyceps spp. especially Ophiocordyceps sinensis, widely known as “Chóng cáo” (Dông-chóng-xià-cáo) that grows on caterpillars of the genus Thitarodes (Lepidoptera: Hepialidae) called “ghost moth”. This fungus has been used in Chinese herbal medicine since Ancient Chinese eras [1]. Some types of fungi belonging to the genus Ophiocordyceps have the ability to produce bioactive compounds with medicinal and pharmaceutical properties such as cordycepin, ophicordin, galactomannan and polysaccharide. These bioactive compounds can be found in the fungal fruiting body and have shown beneficial effects in the prevention of tumors (antitumor), bacteria (antibacterial) and fungi (antifungal). In particular, O. sinensis destroys caterpillars of the genus Thitarodes on the Tibetan Plateau, an autonomous region in China, which have very high market value [2]. Moreover, one report claimed the discovery of essential amino acids, vitamin K, vitamin B₆, Vitamin B₉, and Vitamin B₁₂ in fungi of the genus Ophiocordyceps [3]. Therefore, entomopathogenic fungi of the genus Ophiocordyceps are considered to be beneficial pharmaceutical microbes. Many reports in Thailand describe microbial diversity and information sources concerning the classification of fungal Ophiocordyceps spp. Further studies are required to acquire a suitable body of knowledge to maximize the use of existing natural resources. Consequently, biological elements of the fungal genus Ophiocordyceps were studied in the area of Doi Inthanon National Park, Chiang Mai Province, Thailand.

Material and Methods: Entomopathogens as samples of the genus Ophiocordyceps (Hypocreales: Ophiocordycipitaceae) were collected in Doi Inthanon National Park, Chiang Mai, coordinates UTM; 2063808 N, 436635 E at an elevation of 756-2,560 m above sea level. Four species were identified as Ophiocordyceps irangiensis, O. myrmecophila, O. nutans and O. sphecocephala with three species unidentified and named Ophiocordyceps sp.1, Ophiocordyceps sp.2 and Ophiocordyceps sp.3 derived from [4].
Extraction and Study of Chemical Components and Properties of Fungal Genus Ophiocordyceps: Collected fungal samples were extracted with aqueous ethanol (50% v/v) and analyzed for β-glucan according to the method of [5]. Total amount of water-soluble fungal dietary fiber was analyzed by the enzymatic-gravimetric method [6]. Percentage of fungal antioxidant activity producing β-glucan was analyzed and presented in the form of ferric reducing antioxidant power (FRAP) and DPPH radical scavenging activity (RSA) following the method of [7]. Analysis of total phenolic compounds, flavonoid compounds, β-carotene, and lycopene was conducted using the Folin-Ciocalteu assay method [8]. Analyses of chemical properties of β-glucan extracted from fungi, water solubility and digestion by α-amylase, protease and amyloglucosidase were conducted according to the method of [5].

Analysis of Fungal Bioactive Compounds: Fungal culture of Ophiocordyceps was conducted by drying using a vacuum pump for 5 hours at 60°C. When the drying process was completed, the fungi were stored in a plastic box until required to investigate biological components such as cordycepin and adenosine following the HPLC method [9].

Investigation and analysis of Cordycepin and Adenosine: Analysis followed the HPLC method using a Shimadzu SCL-10A VP system controller (Shimadzu, Japan) comprising a Shimadzu SPD-MioA VP Photo-diode array, an auto-injector, and a reverse phase column (Restek, Ultra IBD 5 μm 150 x 4.6 mm). Standard cordycepin and adenosine (Fluka Analytical Company) solvent were consecutively injected 2 times to draw calibration curves. Injection volume was 10 μl. Determination condition of the samples was set as follows: mobile phase adopted in the analysis consisted of water and methanol in the ratio 85:15 (v/v), separation was conducted in isocratic elution with a flow rate of 1.0 ml/min, detection wavelength of photo-diode array was set at 245 nm, and column temperature was 30°C. Volume of sample injection was 10 μl [9].

Amino Acid Analysis: Amino acid analysis was carried out using a Shimadzu SCL-10A VP (Shimadzu, Japan) consisting of an RF-10A XL Fluorescence, an auto-injector, and a reverse phase column (Ultra C18
5 µm 250 x 4.6 mm). Standard amino acid (Fluka Analytical Company) and standard amino acid solvent were consecutively injected 2 times to draw calibration curves. Injection volumes were set at 11 and 100 µl. Determination condition of the samples was set as follows: mobile phase adopted in the analysis consisted of water and methanol at ratio 90:15 (v/v), separation was conducted in isocratic elution at a flow rate of 1.0 ml/min, detection wavelengths of RF-10A XL Fluorescence were set at EX 263 and EM 313 nm, and column temperature was 40°C with injection volume 10 µl [9].

Results:
Analysis of antioxidants and properties inhibiting fungal oxidation
Many species of fungi contain high β-glucan with antioxidant compounds such as phenolics, flavonoids, ascorbic acid, β-carotene and lycopene. Fungi possess antioxidant properties through the DPPH radical scavenging assay and ferric reducing antioxidant power (FRAP assay) testing methods. Antioxidant compounds inhibit oxidation which is considered an important and widely studied chemical property. Antioxidant compounds can inhibit or oppose the occurrence of cancer cells and may also be associated with stimulating the immune system [10]. Therefore, in addition to β-glucan, antioxidant compounds may help to stimulate the immune response of fungal extracts. This may explain their ability to stimulate the immune system. Experiment results are shown in Table 1. Phenolic compounds were detected at high levels in O. irangiensis and O. phiocordyceps sp.2 at 23.30 and 18.73 mg of gallic acid equivalent, respectively. Moderate amounts of phenolic compounds were found in O. sp.1 and O. nutans at 14.35 and 13.36 mg of gallic acid equivalent/g dry weight, respectively. Amounts of phenolic compounds were probably related to β-glucan which stimulated the immune system. Fungi with high amounts of β-glucan also contained high amounts of phenolic compounds.

All the studied fungi had flavonoid compounds in the range of 13-43 mg of catechin equivalent/g dry weight. O. sphececephala and O. sp.2 showed the highest amounts of flavonoid compounds at 43.25 and 41.06 mg of catechin equivalent/g dry weight, respectively (Table 1).

<table>
<thead>
<tr>
<th>Ophiocordyceps</th>
<th>Phenolic compounds (mg of gallic acid/g of dried extract)</th>
<th>Flavonoid compounds (mg of catechin/g of dried extract)</th>
<th>Ascorbic acid (mg of ascorbic acid/g of dried extract)</th>
<th>Beta-carotene and lycopene (µg of carotenoid/g of dried extract)</th>
<th>DPPH (%RSA)</th>
<th>FRAP (µM of ferric iron reduced/g of dried extract)</th>
</tr>
</thead>
<tbody>
<tr>
<td>O. irangiensis</td>
<td>23.30</td>
<td>13.11</td>
<td>0</td>
<td>18.64</td>
<td>12.31</td>
<td>71</td>
</tr>
<tr>
<td>O. myrmecophila</td>
<td>2.41</td>
<td>2.54</td>
<td>0</td>
<td>18.18</td>
<td>11.67</td>
<td>76</td>
</tr>
<tr>
<td>O. nutans</td>
<td>13.36</td>
<td>37.10</td>
<td>0</td>
<td>19.44</td>
<td>12.15</td>
<td>86</td>
</tr>
<tr>
<td>O. sphececephala</td>
<td>10.50</td>
<td>6.25</td>
<td>0</td>
<td>19.22</td>
<td>11.82</td>
<td>79</td>
</tr>
<tr>
<td>Ophiocordycps sp.1</td>
<td>14.35</td>
<td>26.56</td>
<td>0</td>
<td>18.92</td>
<td>15.26</td>
<td>89</td>
</tr>
<tr>
<td>Ophiocordycps sp.2</td>
<td>21.70</td>
<td>11.67</td>
<td>0</td>
<td>16.53</td>
<td>11.16</td>
<td>87</td>
</tr>
<tr>
<td>Ophiocordycps sp.3</td>
<td>3.45</td>
<td>21.17</td>
<td>0</td>
<td>21.21</td>
<td>10.83</td>
<td>67</td>
</tr>
</tbody>
</table>

The studied fungi did not contain ascorbic acid compounds but all demonstrated antioxidant compounds as β-carotene and lycopene in different amounts. β-carotene compounds were revealed at higher values than lycopene compounds in all fungi at 16-21 µg/g dry weight. Lycopene was found in the range of 10-15 µg/g dry weight. Highest quantification of β-carotene was identified in O. sp.3, followed by O. nutans at 21.21 and 19.44 µg/g dry weight, respectively, while O. sp.1 had the highest amount of lycopene at 15.26 µg/g dry weight. All types of fungi showed antioxidant properties at a high level, especially O. sp.1, O. sp.2 and O. nutans with antioxidant properties higher than 80%. Comparison of fungal sample antioxidant properties by FRAP assay found that O. nutans had the highest antioxidant property at 51.11 µM of ferric iron reduction µg/g dry weight (Table 1).

Beta-Glucan Extraction and Chemical Analysis from Fungi
Extraction of β-glucan from Fungi: Results for the culture of β-glucan compounds in fungi collected from Doi Inthanon National Park were limited to small amounts. Percentages of β-glucan compounds are
shown in Table 2 as % yield for each type of fungi. The extraction method used was modified from [11] and conducted under alkaline condition. Results show that all types of Ophiocordyceps provided very low amounts of extracted β-glucan. The % yield of extraction in O. myrmecophila was the highest, followed by O. irangiensis, while other types provided extraction yields which were below detection.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Sample (g)</th>
<th>β-glucan (g)</th>
<th>% Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>O. irangiensis</td>
<td>200</td>
<td>0.23</td>
<td>0.14</td>
</tr>
<tr>
<td>O. myrmecophila</td>
<td>200</td>
<td>0.34</td>
<td>0.16</td>
</tr>
<tr>
<td>O. nutans</td>
<td>50</td>
<td>Below detection</td>
<td>Below detection</td>
</tr>
<tr>
<td>O. sphecocephala</td>
<td>50</td>
<td>Below detection</td>
<td>Below detection</td>
</tr>
<tr>
<td>Ophiocordyceps sp.1</td>
<td>50</td>
<td>Below detection</td>
<td>Below detection</td>
</tr>
<tr>
<td>Ophiocordyceps sp.2</td>
<td>50</td>
<td>Below detection</td>
<td>Below detection</td>
</tr>
<tr>
<td>Ophiocordyceps sp.3</td>
<td>50</td>
<td>Below detection</td>
<td>Below detection</td>
</tr>
</tbody>
</table>

Water-Soluble and Water-Insoluble β-Glucan: O. myrmecophila can be cultured in large amounts compared to other types of fungi that have growth limitations. The fungus was dried at 60°C and analyzed for type of dietary fiber by the enzymatic-gravimetric method. Fungal extract was reacted with three enzymes; amylase, protease, and amyloglucosidase. Study results showed that O. myrmecophila contained high dietary fiber (45.10%) with 41.10% as water-insoluble fiber, while 4.58% dissolved in water. An alkaline extraction method [11] was used to extract β-glucan that can dissolve in water as equal to 0.58 mg of 100 mg dry samples. Therefore, water-soluble dietary fiber in O. myrmecophila containing β-glucan accounted for 4.85% (Table 3).

<table>
<thead>
<tr>
<th>Type of fiber</th>
<th>Content (% w/w)</th>
<th>Water-soluble β-glucan (% w/w)</th>
<th>β-glucan water soluble fiber (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total fiber</td>
<td>45.10</td>
<td>0.58</td>
<td>4.85</td>
</tr>
<tr>
<td>Water-soluble fiber</td>
<td>4.58</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water-insoluble fiber</td>
<td>41.10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Bioactive Compound Analysis of Ophiocordyceps: Cordycepin and adenosine components found in O. nutans were 440.65 and 5.90 mg/100 g, respectively. O. sphecocephala showed a level of 306.41 mg/100 g while O. irangiensis contained 230.86 mg/100 g with adenosine at 13.80 mg/100 g. O. nutans revealed 5.90 mg/100 g of adenosine (Table 4).

<table>
<thead>
<tr>
<th>Sample</th>
<th>Bioactive substances (mg/100 g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cordycepin</td>
</tr>
<tr>
<td>O. irangiensis</td>
<td>230.86</td>
</tr>
<tr>
<td>O. myrmecophila</td>
<td>230.00</td>
</tr>
<tr>
<td>O. nutans</td>
<td>440.65</td>
</tr>
<tr>
<td>O. sphecocephala</td>
<td>306.41</td>
</tr>
</tbody>
</table>

Amount of free-form amino acids ranged from 0 to 4.14 mg/g in O. irangiensis and 0.01 to 7.35 mg/g in O. nutans as the highest. Essential amino acids included arginine 7.35 mg/g, methionine 2.95 mg/g, and proline 2.31 mg/g. O. myrmecophila contained alanine 3.96 mg/g, valine 0.96 mg/g, and leucine 0.57 mg/g (Table 5).
Table 5. Amounts of Essential Amino Acids from Ophiocordyceps

<table>
<thead>
<tr>
<th>Amino acid</th>
<th>O. irangiensis</th>
<th>O. myrmecophila</th>
<th>O. nutans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspartic acid</td>
<td>0.03</td>
<td>0.13</td>
<td>0.31</td>
</tr>
<tr>
<td>Serine</td>
<td>0.08</td>
<td>0.25</td>
<td>0.49</td>
</tr>
<tr>
<td>Glutamic acid</td>
<td>0.06</td>
<td>0.24</td>
<td>0.51</td>
</tr>
<tr>
<td>Glycine</td>
<td>0</td>
<td>0.29</td>
<td>0</td>
</tr>
<tr>
<td>Histidine</td>
<td>0.03</td>
<td>0.23</td>
<td>0.01</td>
</tr>
<tr>
<td>Arginine</td>
<td>4.14</td>
<td>0</td>
<td>7.35</td>
</tr>
<tr>
<td>Threonine</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Alanine</td>
<td>1.70</td>
<td>3.96</td>
<td>3.03</td>
</tr>
<tr>
<td>Proline</td>
<td>0.59</td>
<td>0</td>
<td>2.31</td>
</tr>
<tr>
<td>Tyrosine</td>
<td>0.01</td>
<td>0.02</td>
<td>0</td>
</tr>
<tr>
<td>Valine</td>
<td>0</td>
<td>0.96</td>
<td>0</td>
</tr>
<tr>
<td>Methionine</td>
<td>0.94</td>
<td>0</td>
<td>2.95</td>
</tr>
<tr>
<td>Lysine</td>
<td>0.10</td>
<td>0.28</td>
<td>1.35</td>
</tr>
<tr>
<td>Isoleucine</td>
<td>0</td>
<td>0.23</td>
<td>1.11</td>
</tr>
<tr>
<td>Leucine</td>
<td>1.02</td>
<td>0.57</td>
<td>1.39</td>
</tr>
<tr>
<td>Phenylalanine</td>
<td>0.16</td>
<td>0.18</td>
<td>0.29</td>
</tr>
<tr>
<td>Total</td>
<td>7.80</td>
<td>5.49</td>
<td>5.40</td>
</tr>
</tbody>
</table>

Discussion: Previous studies determined that fungi having high dietary fiber also contained high amounts of β-glucan [12]-[14]. However, the molecular structure of β-glucan in each fungus affected its chemical properties of digestion by mild acid or alkaline conditions in the process of fiber analysis. Therefore, amounts of fiber were obtained at different levels. Studied fungi with high dietary fiber were Ophiocordyceps sp.1, O. sp.2 and O. sp.3. Results from the extraction indicated that all types of Ophiocordyceps provided very low amounts of extracted β-glucan. Percentage yield of extraction in O. myrmecophila was the highest followed by O. irangiensis, while others provided very low extraction yield. Furthermore, compared to the extraction method using enzymes and alkaline extraction in oat grain, the percentage of extraction yield by enzyme extraction was higher [15]. Antioxidant compounds found in samples of Ophiocordyceps sp.1, O. sp.2 and O. sp.3 from analysis by both DPPD and FRAP assay methods revealed that the antioxidant compounds found in O. irangiensis and O. myrmecophila were also found in Ophiocordyceps sp.1, O. sp.2 and O. sp.3 with high β-glucan. All of these fungi can detect oxidation, similar to O. irangiensis and O. myrmecophila. This result was consistent with a previous report concerning the property of opposing cancer incidence and stimulation of the immune system [16]. Thus, all these fungi showed potential stimulation response to the immune system in experimental cells. Various types of antioxidant compounds found in the fungi can enhance and stimulate the immune system. O. nutans is a fungal type that can be collected in large amounts between June and January around Doi Inthanon National Park, Chiang Mai Province.

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Rungkiat Kawpet
Faculty of Science and Technology,
Suan Dusit University, Bangkok 10700, Thailand

Kanungrat Kummanee
Faculty of Agriculture at Kamphaeng Saen, Kasetsart University,
Kamphaeng Saen Campus, Nakhon Pathom 73440, Thailand

Samaporn Saengyot
Department of Plant Protection, Faculty of Agricultural Production,
Mae Jo University, Chiang Mai 50290, Thailand
IMMUNOGENICITY EVALUATION OF RECOMBINANT STREPTOCOCCUS SUI S SAO PROTEIN PRODUCED IN ESCHERICHIA COLI pET15b-SA O IN BALB/c MICE MODEL

SOMBOONSODE K., MEERAK J.

Abstract: Streptococcus suis is an important swine zoonotic pathogen associated with meningitis, arthritis, septicemia and hearing loss which lead to swine economic loss worldwide. SAO (surface antigen one) protein, is commonly found on the cell surface of S. suis and showed a high immunogenic antigen and were reported previously to protect S. suis infection in swine and mice models. In this study, S. suis serotype 2 sao gene was amplified the sao gene (1.7 kb) with sao specific primers. The purified PCR product of sao gene was amplified from gDNA and subsequently clone into the plasmid pET15-b. The sequences of amplified sao gene and SAO protein showed 98% similarity to the reference in Genbank (accession no.AM946016). Expression of E. coli/ pET-SA O was performed by western blot using mouse anti-histidine tag as a primary antibody and protein with molecular weight approximately 110 kDa was detected as according to S. suis SAO. To determine the immunogenicity of rSAO in this study as a subunit vaccine, rSAO was purified with His-Tag selected Ni⁺ NTA bead and prepared for intramuscular injection. A purified 100 µg of rSAO mixed with an equal volume of incomplete Freund’s adjuvant was injected in mice (n=5) for 8 weeks and with 1 to 3 weeks interval vaccination when PBS was used as a control group (n=5). Serum was collected every week till the end of experience to examine the antibody titer (total IgG, IgG1 and IgG2a). The results indicated that vaccination group revealed a significant (P<0.05) induction with the total rSAO specific IgG antibody response when compared with control group since the 3rd weeks and increased every week. In addition, the antiserum showed the IgG2a and IgG1 subclass which suggested that administration of this rSAO stimulate the balance of Th1 and Th2 response. The findings in this study might be useful for alternative low-cost subunit vaccine production against S. suis infection for swine and may able to wildly use the vaccine for livestock in developing countries.

Keywords: Streptococcus Suis, SAO Vaccine, Swine Vaccine, Recombinant S. Suis SAO.

Introduction: Streptococcus suis is a zoonotic pathogenic bacteria, which cause the severe symptoms not only in swine but also in human including arthritis, endocarditis, meningitis, septicemia, and hearing loss, that effect the swine economical loss worldwide. According to previous reports, S. suis infection in swine and human was found in north America, south America, Europe (such as France, Sweden, Denmark and Italy) and Asia (especially in Vietnam, Thailand, and China) [1]. Naturally S. suis inhabits in tonsils and nasal cavities in adult swine but sometime causes the disease in sucking piglets or adult during stressful condition. The infection of S. suis infection in human was found in people who works in swine slaughterhouse and contacts or consumes infected raw pork and its products [2] which resulted in skin injury, fever, headache, hearing loss and neck stiffness [3]. There are total thirty-five serotypes of S. suis, but serotype 2 is the most reported for S. suis infection in swine and human [4]. S. suis infection should be considered and recently control of S. suis infection was only the uses of antibiotic such as penicillin mixed with feed or water to swine. Afterward the recombinant plasmid technique was used for producing antigen proteins to immunize and for using as sub-unit vaccines. However, only few vaccines are commercial available with high price and not freely used among developing countries, especially in Asia. S. suis sao gene that encode for Surface Antigen One (SAO) protein, is highly conserved among S. suis strains and has become a potential antigen for the development of effective vaccines against S. suis infection. The SAO is found on the cell surface and a previous study showed that immunization of purified SAO together with Quil A was able to prevent the infection with S. suis in swine, mice and reduce mortality rate of swine up to 80% [6] by eliciting strong humoral antibody responses, decrease clinical signs and bacterial dissemination, increase survival rates [7]. Most of the development of the vaccine was done in the prevention and against S. suis serotype 2 infections which was antimicrobial high frequency resistance [8]. The aim of this study was to construct and demonstrate the administration of purified recombinant SAO, which expressed from E. coli containing a plasmid, as a single protein for vaccination in mice and determined the immunogenicity. In fact, this work was performed for preliminary
examination of using SAO alone to stimulate the antibody response for further development of an oral vaccination of live recombinant probiotic bacteria producing \( S. \) suis SAO.

**Materials and Methods:**

**Bacterial Strains, Plasmids And Growth Conditions:** \( E. \) coli strain DH5\( \alpha \) and rosetta gami DE3 were grown at 37°C in Luria-Bertani (LB) medium if necessary, ampicillin was added at to final concentration 50\( \mu \)g/ml. The gene expression was examined by using pET15b expression plasmid.

**Construction of Recombinant \( E. \) coli pTZ57R/T-SA0:** The genomic DNA of \( S. \) suis strain P1/7 (serotype 2) was used as the template for amplifying sao gene using oligonucleotide primers designed with \( Nde \)I and \( BamHI \) restriction sites, (Sao_For 5’ CAT ATG AAT ACT AAG AAA TGG AGA 3’ and Sao_Rev 5’ GGA TCC GTA TCA GGT AGG TGA TTA TTA 3’). PCR amplification was performed using EmeraldAmp® GT PCR master mix (Takara, Japan). The purified PCR product was ligated into pTZ57R/T (TA-cloning vector) to generate pTZ57R/T-sao using InstAclone PCR Cloning Kit (Thermo science, USA) and sub sequence transformed into \( E. \) coli DH5\( \alpha \) competent cells which were prepared following Sambrook and Russel [9]. The competent cells were suspended in a pre-chilled electroporation cuvette with 1 \( \mu \)l of recombinant plasmid pTZ57R/T-sao and transformed using Biorad Genepulser (1800 V, 25 \( \mu \)F and 200 \( \Omega \)). Transformants in the cuvette were recovered in LB broth and then spread on LA agar containing 50\( \mu \)g/ml ampicillin and incubating at 37°C for 16-18 hours. The transformant \( E. \) coli DH5\( \alpha \) pETTZ57R/T-SA0 were screened based on the resistant of antibiotic and the resistant colonies were selected for confirmation by colony PCR and DNA sequencing with sao specific primers.

**Construction of Recombinant Plasmid \( E. \) coli pET15b-SA0:** pTZ57R/T-sao was extracted by alkaline lysis method following Sambrook and Russel [9] and digested with \( Nde \)I and \( BamHI \), respectively. The purified sao fragment (1.7 kb) was ligated into \( E. \) coli expression vector pET15b to obtain recombinant plasmid pET15b-SA0. Plasmid pET15b-SA0 was transformed into \( E. \) coli rosetta gami DE3 by electroporation as described above. The transformants were then selected on LB containing 50 \( \mu \)g/ml of ampicillin and then confirmed by colony PCR with sao specific primers.

**Expression of pET15b-SA0 in \( E. \) coli rosetta:** The recombinant \( E. \) coli harboring pET15b-SA0 was cultured in 5 ml of LB broth containing 50 \( \mu \)g/ml ampicillin, incubated with shaking at 200 rpm 37°C overnight. The seed culture was inoculated into 50 ml of LB broth with initial O.D. 600 nm at 0.03 and incubated until the turbidity reached to 0.4. Isopropylthio-\( \beta \)-D-thiogalactose (IPTG) was added to the final concentration of 1mM and continued incubating for 3 hours. The cells were collected by centrifugation and SAO was purified from \( E. \) coli by sonication using Misonix Sonicator S-4000 (Misonix, New York, USA) at 40% amplitude (pulse on 10 sec./ pulse off 10 sec.) for 5 min. Supernatant and cell pellets were separated by centrifugation and then examined the recombinant protein with sodium dodecyl sulfate (SDS)-polyacrylamide gel electrophoresis using 8% acrylamide gel. Protein were transferred to a PDVF membrane with 60mA for 90 min. The protein on membrane were detected for rSAO using western blot analysis with 6x-His Tag Monoclonal Antibody (Thermo Scientific, USA) that specific with his tag protein at the end of multiple cloning site on pET15b. HRP-conjugated Goat anti-Mouse IgG (H+L) was used as a secondary antibody (Thermo Scientific, USA) for chemiluminescent detection of positive band.

**Purification of rSAO and Vaccine Preparation:** The rSAO produced in \( E. \) coli pET15b-SA0 was purified using HisPur Ni-NTA Beads (Thermo scientific, USA) according to the manufacturer’s instructions. Purified recombinant protein SAO was measured a concentration with BCA protein assay kit (Thermo Scientific, USA). A 50 \( \mu \)l of 100 \( \mu \)g purified rSAO was freshly mixed with equal volume of Freund’s incomplete adjuvant (Thermo science, USA) and used for further vaccination.

**Immunization and Blood Sampling:** Six to eight-weeks-old BALB/c female mice were purchased from Nomura Siam International Co., Ltd. The animal experimentation was approved and handled at Chiang Mai University (Ethical approval 2560MC-0002). The experiment was carried out with intramuscular immunization with the sub-unit vaccine described above at weeks 0, 1, 2, 3, 4, 5, 7 and 9. and PBS group
was used as a control (n=5, each group). Blood sampling was collected separately at the same week of immunization and sera were prepared by centrifugation and kept at -20°C until used.

Detection of rSAO-specific IgG by Enzyme-linked immunosorbent assay (ELISA): The rSAO-specific antibody was determined by ELISA in 96 wells plate coated with 1μg purified rSAO overnight at 4°C. Each serum was diluted to determine the total IgG and IgG subtype (IgG1 and IgG2a). Briefly, the well was blocked with blocking solution and incubated for 1 hour at room temperature. Titers of rSAO-specific antibody in mouse sera were determined using goat anti mouse IgG (H+L)-HRP conjugate (Bio-rad, USA), IgG1 with goat anti mouse IgG1 (H+L)-HRP conjugate and IgG2a with goat anti mouse IgG2a (H+L)-HRP conjugate (Invitrogen, USA) as secondary antibody for detecting total IgG, IgG1 and IgG2a, respectively. The substrate solution comprising TMB (3,30,5,5-tetramethylbenzidine) and Hydrogen peroxide (H2O2) were added to the well and then incubated in dark at room temperature. The reaction was stopped with 2N sulfuric acid (H2SO4) and measured at O.D. 450 in a micro plate reader (Spectra MR, UK).

Statistical Analysis: The data was analyzed by One-way ANOVA which was used to compare the antibody titer of rSAO-specific antibody in serum with control groups. Statistical significance was inferred when \( p < 0.05 \).

Results and Conclusions:
Plasmid Construction and DNA Sequencing: The 3 positive colonies of \( E. coli \) pTZR/T-SA0 from colony PCR were confirmed by DNA sequencing and showed 98% similarity with database in GeneBank (data not shown). The deduced amino acid were also compared with database, especially, with those mismatch bases and they were revealed 98% homology with the reference (data not shown). In addition, the mismatch amino acids found in this research were not at the specific domain which might not affected the stimulation of this antigen.

Expression of sao in \( E. coli \): rSAO (110 kDa.) was found only in the supernatant after cell lysis by sonication which referred SAO was accumulate in the cytoplasm of \( E. coli \) induced with mM IPTG during growth while the culture supernatant of all bacteria were not detected (not secreted) (Figure 1). This finding might be useful for low cost and convenient purification of this protein from \( E. coli \).

Purification of Recombinant SAO Protein: The rSAO protein was purified by HisPur Ni-NTA beads (Thermo science, USA) and determined by western blot analysis and SDS-PAGE to confirm its purity. A protein molecular weight of 110 kDa. was mostly found in the elution tube with high purity that recommend to suitable use for immunization (Figure 2).
Detection of rSAO-Specific Antibody by ELISA Assay: Immunogenicity test of rSAO in sera of mice immunized with rSAO were significantly \((p< 0.05)\) higher than the control group and successfully elicited antibody responses in mice (Figure 3a). Determination of subtype specific antibody IgG1 and IgG2a were measured in an ELISA assay to evaluate the immune response. The result demonstrated that IgG2a show the titer higher than IgG1 (Figure 3 b and 3c) but not significant. This suggested that rSAO stimulated both Th1 and Th2 response in mice.

**Discussion:** *S. suis* is a zoonotic pathogen which commonly found in swine causing severe symptoms include meningitis, septicemia, arthritis, permanent hearing loss to people in close contact with infected swine or pork products [10]. To develop the effective vaccines, the cell wall and extracellular proteins of *S. suis* serotype 2 were analyzed and the results showed that the serum specific antibodies were higher in both patients and infected swine which suggested that proteins on cell surface have a high potential to be a vaccine candidate [11]. *S. suis* surface protein, SAO protein was recognized as its high conservation among *S. suis* serotypes [12]. The immunization of piglets with purified SAO from *S. suis* elicits a significant humoral antibody response [6] and discovered that three allelic variants of the sao gene (S, M and L) which sao-M showed the most commonly found in *S. suis* [13]. In this study, recombinant SAO protein-M (rSAO-M) was produced by *E. coli* which was induced to accumulate protein in its cytoplasm for a conveniently future purification and used as sub-unit vaccine. The results of rSAO-specific antibody titer indicated that vaccination group (rSAO) elicited rSAO-specific antibodies to immunoglobulin G (IgG) were significantly \((p<0.05)\) difference compared with control group (PBS). In subtype induction
found that rSAO-specific antibodies of the IgG2a was almost equal to IgG1 which in agreement with the previous works. Moreover, rSAO-specific antibodies were high in the vaccinated piglets group and levels of interferon (IFN)-γ, interleukin (IL)-4, IL-6, and IL-12 were increased in piglets born from vaccinated sows when compared with control group [14]-[15]. However, the cytokines response had not been examined in our study due to the barrier of cell culture laboratory setting up and since this work was only the preliminary test of vaccination of SAO alone. Moreover, the cross-reaction of rSAO-M was against the other 6 serotypes of this specie [16]. Our study suggested that i.m. immunization with rSAO is a potential vaccine candidate against S. suis infection but might need a further examination in swine.

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References:


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Somboonsode K.
Department of Biology, Faculty of Science,
Chiang Mai University, Chiang Mai, Thailand 50202

Meerak J.
Department of Biology, Faculty of Science,
Chiang Mai University, Chiang Mai, Thailand 50202
jomjoyjon@hotmail.com
Abstract: Thai northern tradition vegetable and fruits are reported to be the sources of essential compounds that able to prevent some of infectious and non-infectious diseases. Therefore, this study aims to determine the anti-colon cancer and anti-foodborne pathogenic bacteria activities of non-study rural edible vegetables. Cajanus cajans (L.) Millsp. (Tua Rae) leaf extracted with 95% ethanol (Cc95E) was evaluated for those activities and showed the highest inhibitory effect to all gram positive and some of gram negative bacteria including E. coli, Salmonella Thyphi, Staphylococcus aureus, Bacillus cereus and Listeria monocytogenes. The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of Cc95E to those 5 species were in the ranges of 20.8-41.6 and 20.8-83.3 mg/ml, respectively. Antioxidant activities were examined by ABTS assay and total phenolic content (TPC) was measured for further application as anti-cancer agent. For anti-colon cancer cell, Caco2 cell line treated with Cc95E which showed the inhibitory effect with IC$_{50}$ of 16.13 µg/ml closely to a positive control (curcumin; IC$_{50}$ 2.88 µg/ml). To examine if the effect of plant extracts to colon cancer cell was controlled by apoptosis pathway, CaCo-2 cells line was re-treated with Cc95E with different concentration to examine the DNA fragmentation which referred as early apoptosis control cell-death. At the concentrations 3.125 µg/ml and 6.25 µg/ml of Cc95E showed the exhibited chromosome fragmentation. Thus, the results in this study indicated that C. cajan extracts may be useful and has a potential for application in medical cancer treatment but further studies are required.

Keywords: Cajanus Cajan (L.) Millsp., Anti-Colon Cancer, Anti-Foodborne Pathogenic Bacteria, Antioxidant, Apoptosis, Plants Extracts.

Introduction: Colon cancer is a malignance disease that is the major problem to public health (Tariq and Ghias, 2016). Although the alternative treatment for colon cancer provide many methods however, curing is not always success in the final stage of cancer. Prevention is one of the effective way for reduction of cancer patients. Thai rural vegetable which are daily used were reported for their ability for cancer treatment and antioxidant agents (Pajaniradje et al. 2014) however, most of them were rack of scientific proofs. In addition, not only for cancer treatment, most of them were also reported the abilities to kill some of pathogenic bacteria including Salmonella sp., S. aureus and L. monocytogenes (Daglia, 2012). Therefore, in this research, we aimed to examine and proof on using one traditional Thai Northern vegetable called Tua Rae or Cajanus cajans (L.) Millsp. as a normal meal of Northern people can help prevent or curing colon cancer. The leave of Tua Rae was extracted with the basically method by ethanol and water for future application in a low cost. The extracts were determined for activity against pathogenic bacteria that frequently contaminated in food, antioxidant activity and anti-colon cancer in vitro.

Materials and Methods:
**Plant Samples Preparation:** Leaf of Cajanus cajans (L.) Millsp. (Tua Rae) was dried at 60 °C for 2 days and then blended to be small pieces before separated extraction with 95% ethanol (Cc95E) and distilled water (CcW). The extracts were filtered through two layers of Muslin cotton and Whatman no.1 filter paper. The solvents were removed using rotary evaporator then; the concentrated extracts were lyophilized to dryness. (Kuete et al., 2011)

**Bacterial Strains:** Five bacterial strains included Escherichia coli ATCC 8739, Salmonella enterica serovar Typhimurium ATCC 7331, Staphylococcus aureus ATCC 6538P, Bacillus cereus and Listeria monocytogenes LI 1173. All strains were cultured in Luria-Bertani agar (LB agar) plate and incubated at 37 °C for 24 hrs. that would be examined.
Cell Lines And Medium: CaCo-2 cell ATCC®HTB-37 (colorectal adenocarcinoma cell) was cultured in minimum essential medium (MEM) with 20% fetal bovine serum (FBS) as complete media and then, incubated in a humidified atmosphere with 5% CO₂ at 37 °C for further determination.

Anti-Foodborne Pathogenic Bacteria by Agar Well Diffusion: The microbial inhibition was determined by method of Nauman et al (2011). The bacterial strains were inoculated into Luria-Bertani broth (LB broth) and incubated at 37 °C for 24 hrs. The inoculum was adjusted the turbidity with a 0.5 McFarland standard then, spread onto LB agar plate and the wells were made by sterilized cork-borer size 8 mm. The crude extracts were added into each well and incubated at 37 °C for 24 hrs. then, the inhibition zone was measured and compared with 200 µg/ml gentamycin was used as a positive control. For the extracts that showed the inhibition zone would be used for further evaluation.

MIC and MBC Determinations: Bacterial strains were inoculated into LB broth and incubated at 37 °C for 24 hrs. The inoculum was adjusted the turbidity same as above then added to a 96-well plate and mixed with equal volume of LB broth. The serial two fold dilutions of crude extracts were made ranging from 250 – 31.25 mg/ml and added 50 µl to each well of previous mixture. The plate was incubated at 37 °C for 24 hrs. then, reading the MIC as lowest concentration of the extracts compared with 10 µg gentamycin as a positive control. For the MBC determination was sub-cultured from visible growth well onto LB agar plate by dropping method then, incubated at 37 °C for 24 hrs. and reading the MBC as lowest concentration of the extracts (Tudela et al., 2002)

Antioxidant Activity by ABTS Assay: The free radical scavenging ability was determined according to the method of Bunea et al. (2011). The ABTS cation radical was produced by reaction of 7 mM of ABTS diammonium salt solution mixed with equal volume of K₃S₂O₈ and placed in dark condition at room temperature for 12 hrs. The ABTS working solution was prepared by diluting the stock solution with distilled water to an absorbance of 0.70 ± 0.20 at 734 nm. The crude extracts were added 5 µl into a 96-well plate and mixed with 195 µl of the diluted ABTS solution, the plate incubated at room temperature for 10 min in dark condition, then the absorbance was measured at 734 nm. Percentage of inhibition was calculated and expressed as IC₅₀ (mg/ml) value compared with trolox as a positive control.

Total Phenolic Contents (TPC): The TPCs were evaluated using Folin-Ciocalteu'phenol reagent (FC) assay by the method of Zongo et al. (2010). Five µl of each crude extracts were added into a 96-well plate and mixed with 100 µl of 10% FC, incubated at room temperature for 5 min then, added 80 µl of 7.5% NaCO₃ to each well and placed at room temperature for 30 min in dark condition. The absorbance was measured at 756 nm, the standard (gallic acid) was calculated and the results were expressed as mg GAE/g dry weight.

Anti-Colon Cancer Activity by MTT Assay: Cell viability was determined using CaCo-2 cell lines according to the method of Eo et al. (2014). The cells were seeded in 96-well plates at a density of 1 × 10⁴ cells/well and incubated for 24 hrs to allow adhered and grow. The crude extracts were treated to each well and incubated at 37 °C for 48 hrs. then, 5 mg/ml MTT in PBS was added and incubated at 37 °C for 4 hrs. The formazan products were solubilized with acidic isopropanol (0.04 N HCl) and the absorbance was measured at 570 nm. The viability percentage was calculated compared with curcumin as a positive control.

Partial Purification: The Cc95E was partial purified for examination its anti-bacterial and anti-colon cancer activities. This method was adjusted from Nandi et al. (2012); the crude extract was dissolved with methanol and subjected to chromatography over a column of Sephadex LH20. The purified compounds were prepared to be stock solution by dissolving with DMSO, and then collected at -20 °C for further assay similar to previous methods.

Statistical Analysis: All data were performed by ANOVA. The correlations with P values lower than 0.05 (P<0.05) were considered significant and followed by Duncan’s multiple range tests using the Statistical Package for Social Sciences (SPSS) version 16 for Windows.
### Table 1: Anti-Foodborne Pathogenic Bacteria Activity of Cajanus Cajan (L.) Millsp. Extracts.

<table>
<thead>
<tr>
<th>Extracts</th>
<th>Activity</th>
<th>Bacillus cereus</th>
<th>Staphylococcus aureus</th>
<th>Listeria monocytogenes</th>
<th>Escherichia coli</th>
<th>Salmonella Typhimurium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inhibition zone (mm)</td>
<td>MIC (mg/ml)</td>
<td>MBC (mg/ml)</td>
<td>Inhibition zone (mm)</td>
<td>MIC (mg/ml)</td>
<td>MBC (mg/ml)</td>
</tr>
<tr>
<td>Cc95E</td>
<td>21.00 ± 1.00&lt;sup&gt;a&lt;/sup&gt;</td>
<td>20.8</td>
<td>20.8</td>
<td>22.33 ± 0.58&lt;sup&gt;a&lt;/sup&gt;</td>
<td>20.8</td>
<td>41.6</td>
</tr>
<tr>
<td>CcW</td>
<td>10.67 ± 0.58&lt;sup&gt;d&lt;/sup&gt;</td>
<td>41.6</td>
<td>41.6</td>
<td>9.67 ± 0.58&lt;sup&gt;ef&lt;/sup&gt;</td>
<td>41.6</td>
<td>41.6</td>
</tr>
<tr>
<td>F1</td>
<td>0.00 ± 0.00&lt;sup&gt;c&lt;/sup&gt;</td>
<td>-</td>
<td>-</td>
<td>0.00 ± 0.00&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>F2</td>
<td>0.00 ± 0.00&lt;sup&gt;e&lt;/sup&gt;</td>
<td>-</td>
<td>-</td>
<td>0.00 ± 0.00&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>F3</td>
<td>0.00 ± 0.00&lt;sup&gt;e&lt;/sup&gt;</td>
<td>-</td>
<td>-</td>
<td>0.00 ± 0.00&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>F4</td>
<td>17.67 ± 1.15&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.052</td>
<td>0.052</td>
<td>18.33 ± 0.58&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.052</td>
<td>0.052</td>
</tr>
<tr>
<td>F5</td>
<td>18.00 ± 1.00&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.052</td>
<td>0.104</td>
<td>18.33 ± 0.58&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.052</td>
<td>0.052</td>
</tr>
<tr>
<td>F6</td>
<td>18.67 ± 1.15&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.052</td>
<td>0.208</td>
<td>19.33 ± 0.58&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.052</td>
<td>0.052</td>
</tr>
<tr>
<td>F7</td>
<td>0.00 ± 0.00&lt;sup&gt;c&lt;/sup&gt;</td>
<td>-</td>
<td>-</td>
<td>0.00 ± 0.00&lt;sup&gt;d&lt;/sup&gt;</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>GE</td>
<td>17.67 ± 1.15&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.016</td>
<td>0.008&lt;sup&gt;3&lt;/sup&gt;</td>
<td>19.67 ± 1.15&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.016</td>
<td>0.008&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
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</table>

**Note:** *<sup>a</sup>-<sup>j</sup>* The difference letters in same column are significantly different (P < 0.05).

GE gentamycin (positive control).
**Results:**

**Anti Foodborne Pathogenic Bacteria of Extracts:** The crude extract, Cc95E, showed the higher inhibition to all 5 tested bacteria, especially against gram positive than CcW and better than a positive control (10 µg gentamycin). For the MIC and MBC, Cc95E were range 20.8-41.6 and 20.8-83.3 mg/ml, respectively (Table 1). Thus Cc95E was further purified to determine the activity again. Seven fractions (F1-F7) of Cc95E revealed an interesting result that only fraction F4-F6 inhibited only gram positive bacteria but not a gram negative while others fraction showed no inhibition at all (Table 1.)

**Antioxidant Activity Of Crude Extracts:** The results were found that Cc95E showed a high content of total phenolic and low IC50 of antioxidant activity when compare with control (Table 2). Compare with most of antioxidant compounds in this plant might able to dissolved in alcohol more than water.

<table>
<thead>
<tr>
<th>Extracts</th>
<th>Antioxidant activity</th>
<th>TPC (mg GAE/g dry weight)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cc95E</td>
<td>4.28</td>
<td>157.39 ± 25.03</td>
</tr>
<tr>
<td>CcW</td>
<td>4.58</td>
<td>185.88 ± 15.45</td>
</tr>
</tbody>
</table>

**Anti-Colon Cancer of Extract:** Cc95E extracts showed the potential against colon cancer cells and results showed that Cc95E could inhibit CaCo-2 cells line with the IC50, 16.13 µg/ml. Moreover, the GR metrics of Cc95E showed the values of GR50 as 9.90 and GRmax, -0.59 which referred that cancer cells were completely died (Table 3). After partial purification, F1-F5 were able to kill colon cancer cell with the IC50, GR50, and GRmax values closed to the positive control (curcumin). This suggested that the only some specific compounds in the leave of *Cajanus cajan* (L.) Millsp. were the potential used as anti-colon cancer cell.

<table>
<thead>
<tr>
<th>Fractions</th>
<th>IC50 µg/ml</th>
<th>GR metric</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>GR50</td>
</tr>
<tr>
<td>Cc95E</td>
<td>16.13</td>
<td>9.90</td>
</tr>
<tr>
<td>CcW</td>
<td>33.25</td>
<td>21.80</td>
</tr>
<tr>
<td>F1</td>
<td>6.18</td>
<td>0.97</td>
</tr>
<tr>
<td>F2</td>
<td>6.37</td>
<td>0.80</td>
</tr>
<tr>
<td>F3</td>
<td>5.23</td>
<td>0.47</td>
</tr>
<tr>
<td>F4</td>
<td>4.33</td>
<td>0.48</td>
</tr>
<tr>
<td>F5</td>
<td>5.89</td>
<td>0.78</td>
</tr>
<tr>
<td>F6</td>
<td>11.57</td>
<td>1.20</td>
</tr>
<tr>
<td>F7</td>
<td>10.07</td>
<td>1.66</td>
</tr>
<tr>
<td>Curcumin</td>
<td>2.88</td>
<td>0.23</td>
</tr>
</tbody>
</table>

**Discussion/Conclusions:** Vegetable and fruits extracts have been used as the alternative antimicrobial drugs for treatment of infectious diseases for the decades. In addition, most of Thai vegetable were also reported as a source of natural anti-cancer. *Cajanus cajan* (L.) Millsp. seed was previously reposed as breast cancer drug however, no reports showed its potential for anti-colon cancer before. Thus we determined its activity of both crude and partial purified of leaf extracts. Some of the partial purification fraction showed higher cancer inhibition activity nearly to curcumin which is the well-known anti-cancer agent however, they had some toxic to normal cell (data not shown). This might be another interesting medicinal vegetable for a daily used in the rural as promote as anti-cancer drug. However, the compounds must be purified until the pure compound would be obtained and the toxicity examination must be clarified and study the mechanisms each compound for inhibition of colon cancer cell.

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Khamsaen C.
Department of Biology, Faculty of Science,
Chiang Mai University, Chiang Mai, Thailand 50202
Meerak J.
Department of Biology, Faculty of Science,
Chiang Mai University, Chiang Mai, Thailand 50202
jomjoyjon@hotmail.com
MATHEMATICS, COMPUTERS,
PHYSICAL SCIENCES
BIG DATA, TECHNOLOGY & ENGINEERING SCIENCES
**Abstract:** An attempt has been made to analyse the role of octonions in various unified field theories associated with dyons and the dark matter. Starting with the split octonion algebra and its properties, we have discussed the octonionic unified gauge formulation for $SU(2) \times U(1)$ electroweak theory and $SU(3) \times SU(2) \times U(1)$ grand unified theory. Describing the octonion eight dimensional space as the combination of two quaternionic spaces (namely, associated with the electromagnetic interaction (EM-space) and linear gravitational interaction (G-space)), we have reexamined the unified picture of EM-G space in terms of octonionic split formulation in consistent manner. Consequently, we have obtained the various field equations for unified gravi-electromagnetic interactions. Furthermore, we have reconstructed the field equations of hot and cold dark matter in terms of split octonions. It is shown that the difference between the octonion cold dark matter (OCDM) and the octonion hot dark matter (OHDM) is significant in the formulating of structure of these two, because the velocities of octonion hot dark matter cause it to wipe out structure on small scales.

**Keywords:** Dark Matter, Octonions, Grand Unified Theory.

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V. K. Sharma  
Department of Physics, Kumaun University,  
S. S. J. Campus Almora-263601 (U.K.) India  
vishalphysics985@gmail.com

B. C. Chanyal  
Department of Physics, G. B. Pant University of Agriculture & Technology,  
Pantnagar -263145 (U.K.) India  
bcchanyal@gmail.com

O. P. S. Negi  
Department of Physics, Kumaun University,  
S. S. J. Campus Almora-263601 (U.K.) India  
ops_negi@yahoo.co.in
**KULLBACK-LEIBLER DISTANCE AND STATISTIC TICAL MODEL**

TOMOHIRO WASHINO, TADASHI TAKAHASHI

**Abstract:** Kullback-Leibler distance is discovered in statistical mechanics of the 19th century and is a concept called the relative entropy. In the 20th century, it came to be known that it is important quantity in statistics and learning theory. We cannot only define it in Euclidean space, but also can expand the concept in general probability distribution. Kullback-Leibler distance is not only important as the concept, but also derive an algorithm. Kullback-Leibler distance is not only an important concept, but also it can derive the algorithm. As for the information science meaning of Kullback-Leibler distance and the relations with the mathematic properties, there exist many unknown structures. We constituted some examples about the pole using a computer algebra system and explored the properties.

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Tomohiro Washino  
Graduate School of Natural Science,  
Konan University, Japan,  
email: t-washino-0409@docomo.ne.jp

Tadashi Takahashi  
Department of Intelligence and Informatics,  
Konan University, Japan  
email: takahasi@konan-u.ac.jp
SAMA CIRCULAR MODEL ON FORECASTING SRI LANKAN STOCK MARKET INDICES

DR.W.G. S. KONARASINGHE

Abstract: A stock market or share market is a network of transactions of financial instruments. In general, performances of stock markets are measured by stock market indices. A stock market index is an indicator of the direction of the overall stock market and individual stocks. It is a statistic reflecting the composite value of its components. An increase in the index indicates a rising market; a decreasing in the index indicates a falling market; fluctuation of the index series shows the volatility of the market. These patterns of stock market indices give insights to the investment decisions; especially in portfolio selections, as such forecasting market indices were an immense interest over the past decades. In the Sri Lankan context, All Share price index (ASPI) measures the overall movement of the market, while sector indices measure the performances of twenty business sectors. Many academicians and researchers have attempted to forecast the ASPI, yet it was hard to find studies based on forecasting sector indices. Hence, it was intended to find suitable techniques for forecasting sector indices of the Sri Lankan share market. Pattern recognition of monthly sector indices from year 1994 to 2018 was done by Time Series plots and Auto Correlation Functions (ACF’s). Results revealed that, all the series follow irregular wave patterns with trends. This type of data series can be modeled by the Decomposition Technique or Sama Circular Model (SCM). However, applying Decomposition technique is time consuming and cumbersome. In contrast, the SCM is easy to use and less time consuming, especially the SCM is capable in separating the seasonal and cyclical components with no effort. Therefore the SCM was tested in forecasting sector indices. The ACF of residuals and Ljung-Box Q statistics (LBQ) were used to test the independence of residuals. The Anderson Darling test was used to test the normality of residuals. Forecasting ability of the models was assessed by Mean Square Error (MSE) and Mean Absolute Deviation (MAD). It is concluded that the SCM is capable in forecasting sector indices of Sri Lankan share market.

Keywords: Stock Market, Index, Sama Circular Model.

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Dr. W.G. S. Konarasinghe
Institute of Mathematics & Management,
Ranala, Sri Lanka
sinasisi@gmail.com
APPLICATION OF GROWTH MODEL TECHNIQUES TO STUDY THE ART TREATMENT PROGRESSION AND TO STUDY THE MORTALITY PATTERN OF HIV INFECTED PATIENTS USING NATURAL HISTORY STUDY DATABASE AT YRG CARE MEDICAL CENTRE.

EZHILARASI CHANDRASEKARAN, NAGALINGESWARAN KUMARASAMY, GEETHA RAGUNATHAN

Abstract: Objective: To identify the growth model for viral load with respect to CD4 count and to monitor the mortality pattern of HIV disease through control charts. Methods: A retrospective analysis of 588 patients receiving care at YRG Care Medical Centre, a tertiary HIV referral center in southern India, during the period of 2007 through 2017. MANOVA was performed to determine the growth model of viral load with respect to CD4 count. Fitting of probability distribution has been performed to CD4 count to find the best fit among Weibull, lognormal and exponential distributions. Control charts were drawn to monitor the mortality pattern of HIV infection. Results: The median age of the study subjects at the time of HIV diagnosis was 35 years (range 4–75 years), and the median CD4 count at the baseline was 251 cells/μL. Pulmonary tuberculosis (21.2%) was the most common AIDS-defining illness observed in this cohort. The CD4 count has a significant influence on both the viral load (p = 0.011) and gender (p <0.001). Though the range of CD4 count is in good interval, patients die due to the occurrence of Pulmonary tuberculosis and Cardio respiratory failure. Fitting of probability distribution resulted as a best fit in Weibull distribution for CD4 count. Conclusion: ART is recommended for all HIV-infected individuals, regardless of CD4 count, to reduce the morbidity and mortality associated with HIV infection. Patients are recommended to follow up the treatment regularly so as to prevent the opportunistic infections, which leads to death earlier.

Keywords: HIV – Human immunodeficiency Virus, ART – Antiretroviral therapy, MANOVA – Multivariate Analysis of Variance, AIDS – Acquire Immuno deficiency syndrome.

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Ezhilarasi Chandrasekaran
YRGCARE Medical Centre, Chennai, India
Ezhilarasi Chandrasekaran biostats@yrgcare.org
Nagalingeswaran Kumarasamy
YRGCARE Medical Centre, Chennai, India
Nagalingeswaran Kumarasamy kumarasamy@yrgcare.org
Geetha Ragunathan
SDNB Vaishnav College for Women, Chennai, India
Geetha Ragunathan hayageeth@hotmail.com
LAGRANGIAN MECHANICAL SYSTEMS 
WITH FOUR ALMOST COMPLEX STRUCTURES ON SYMPLECTIC GEOMETRY 

IBRAHIM YOUSIF IBRAHIM ABD ALRHMAN 

Abstract: In this paper we presented an analysis of Lagrange formulas with four Almost Complex Structures we have reached important results in differential geometry that can be applied in theoretical physics.

Keywords: Symplectic geometry, four almost complex structure, Lagrangian Mechanical Systems.

Introduction: The geometric study of dynamical systems is an important chapter of contemporary mathematics due to its applications in Mechanics, Theoretical Physics. The most important papers on the topic entitled Mechanical Equations. 

R. Ye developed a general framework for embedded (immersed) J-holomorphic curves and a systematic treatment of the theory of filling by holomorphic curves in 4-dimensional symplectic manifolds [1]. Audin and Lafontaine introductioned to symplectic geometry and relevant techniques of Riemannian geometry, proofs of Gormov's compactness theorem, an investigation of local properties of holomorphic curves, including positivity of intersections, and applications to Lagrangian embeddings problems [2]. Tekkoyun submitted paracomplex analogue of the Euler-Lagrange equations was obtained in the framework of para-Kählerian manifold and the geometric results on a paracomplex mechanical systems were found [3]. Lisi considered three applications of pseudoholomorphic curves to problems in Hamiltonian dynamics [4]. Tekkoyun and Yayli shown that generalized-quaternionic Kählerian analogue of Lagrangian and Hamiltonian mechanical systems. Eventually, the geometric-physical results related to generalized-quaternionic Kählerian mechanical systems are provided [5]. Kasap submitted Weyl-Euler-Lagrange equations of motion on at manifold [6]. Kasap and Tekkoyun obtained Lagrangian and Hamiltonian formalism for mechanical systems using para/pseudo-Kahler manifolds, representing an interesting multidisciplinary field of research. Also, the geometrical, relativistical, mechanical and physical results related to para/pseudo-Kahler mechanical systems were given, too [7]. Kasap examined Weyl, Euler, Lagrange and Weyl. Hamilton equations on \( R^{2n}_3 \) which is a model of tangent manifolds of constant W-Sectional curvature [8]. Oguzhan and Zeki Kasap submitted Mechanical Equations with Two Almost Complex Structures on Symplectic Geometry, using two complex structures, examined mechanical systems on symplectic geometry, [9].

In this paper, we study dynamical systems with four Almost Complex Structures. After Introduction in Section 1, we consider Historical Background paper basic, Section 2 (Preliminaries) deals with the study Almost Complex Structures. Section 3 is devoted to study Lagrangian Dynamics.

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Ibrahim Yousif Ibrahim Abd alrhman
Department of mathematics - Faculty of Education,
West Kordufan University- Alhoud City-Sudan
Email: iyibrahimi@gmail.com
A REVISED METHOD FOR SOLVING LINEAR PROGRAMMING PROBLEM UNDER FUZZY CIRCUMSTANCES

SAPAN KUMAR DAS, T. MANDAL

Abstract: In many real-world problems, the information is insufficient and uncertain and the parameters are mostly unknown. These problems are quite difficult to be formulated and solved, both methodically and numerically. In these cases, the unknown parameters are dealt by the uncertainty of the parameter. So, many methods have proposed for solving a Fully Fuzzy Linear Programming (FFLP) problem. And accordingly to overcome these limitations a new method has been proposed by using the ranking function. We have considered a FFLP problem with mixed constraints where decision variables are represented by non-negative fuzzy numbers. Triangular convex normalized fuzzy sets are considered for the analysis. To illustrate the applicability and efficiency of the proposed method various numerical examples have been solved and obtained results are discussed.

Keywords: Fully Fuzzy Linear Programming, Fuzzy Optimal Solution, Triangular Fuzzy Numbers, Ranking Function.

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Sapan Kumar Das
Department of Mathematics,
National Institute of Technology Jamshedpur,
Jharkhand 831014, India
E-mail: cool.sapankumar@gmail.com
T. Mandal
Department of Mathematics,
National Institute of Technology Jamshedpur,
Jharkhand 831014, India
E-mail: tmandal.math@nitjsr.ac.in
NANO TOPOLOGY VIA WEAK FORM OF OPEN SETS

M.MELLIS THIVAGAR, V.ANTONYSAMY
V.RAMESH, G.KABIN ANTONY

Abstract: The motive behind this article is to explore the possibility of the weak form of nano topology. By inducing the nano $\omega$-open sets we evolve nano $\omega$-open, nano pre-$\omega$-open sets and nano contra $\omega$-open sets. Finally using nano $\omega$-open sets we discuss respective continuity as well as other related properties.

Keywords: Nano Topology, Nano $\alpha$-Open, Nano $\omega$-Open, Nano $\omega$-Continuity

2010 MSC: 54A05, 54A10, 54C10.
ANALYSIS OF AUTOMOBILE SENSOR DATA

JAIWOOK BAIK

Abstract: Motivation: Sensors are becoming popular in everyday life tasks as the era of Internet of Things (IoT) has lately arrived. They are used in diverse applications domains including business applications such as sales growth, industrial applications such as quality and reliability control of product, military applications such as enemy surveillance, and personal applications such as health monitoring. Automobile is no exception to have a lot of sensor data. But there have only been a few papers that addressed the issue on anomaly detection. So in this paper, we are looking for anomaly behavior in the car sensor data.

Method: First of all, exploratory data analysis is tried for the sensor data in order to find any pattern or any correlations in the sensor data. Next, control charts for independent and correlated data are tried to find out-of-control points in the sensor data. Out-of-control points are interpreted as anomaly behavioral points. Also, unsupervised learning algorithm such as k-means is tried to find clusters among the sensor data.

Findings: Exploratory data analysis is used to find any pattern in the data. For instance, the distribution of accelerator pedal sensor values is very much skewed to the left. The car seemed to have been driven in city at speed less than 45 kilometers per hour. Next, traditional process control charts such as X control chart fails due to severe autocorrelation in each sensor data. ARIMA model has been fitted and X control chart to the residuals from the fitted ARIMA model are used to find any anomaly behavior in the sensor data. Finally unsupervised learning algorithm such as k-means clustering is used to find any anomaly spot in the sensor data. K-means clustering has been done in terms of accelerator pedal and engine rpm, and in terms of engine rpm and transmission rpm. We found that large sensor values get subdivided into two, three, and four disjoint regions. So extreme sensor values are the ones that need to be tracked down for any sign of anomaly behavior in the sensor values.

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Jaiwook Baik
Department of Information Statistics,
Korea National Open University, South Korea
ANALYSIS AND DESIGN STRATEGY FOR
NON-TRADITIONAL SANDWICH CONCRETE INSULATED PANEL (SCIP)
BUILDINGS USING TRADITIONAL ANALYSIS SOFTWARE

MOHAMMAD ADIL, IRFAN KHAN

Abstract: Sandwich Concrete Insulated Panel (SCIP) Technology has been in use since 1960 in aerospace applications and refrigerators etc. and nowadays in constructing buildings. Such type of construction is very economical, durable and strong. But the main problem with this technology is the lack of Analysis and Design strategy. Softwares like ANSYS and ABAQUS etc. are not user friendly for typical analysis and design. Some researchers have worked on these softwares but analysis and design results are time consuming and laborious. Therefore this document has been aimed at developing analysis and design guide using traditional analysis and design tool, SAP2000. A case study of two storey Mosque (Islamabad) has been carried out. In the Mosque, SCIP Technology has been used and the building being modeled and analyzed in SAP2000. Results have shown that analysis and design strategy can be developed for SCIP buildings using SAP2000.

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Mohammad Adil
Assistant Professor, Department of Civil Engineering,
University of Engineering and Technology, Peshawar

Irfan Khan
Researcher, Department of Civil Engineering,
University of Engineering and Technology, Peshawar
A NOVEL CLUSTERING METHOD USING SALP SWARM OPTIMIZATION AND K-MEANS

KAPIL SHARMA, ASHISH KUMAR TRIPATHI, MANJU BALA

Abstract: In today’s digital era, efficient methods are required for the intelligent decision making. Data clustering, an illustrious data analysis method which is being effectively used to analyses the datasets is widely used for unfolding the various real-world problems. K-means is a quick and widely used data clustering technique present in the literature. However, the output of the K-means is biased towards the randomly chosen initial cluster centers. To remedy it, this paper proposes an efficient clustering based on the K-means and salp swarm algorithm and termed as K-SSA. Further, the proposed method is validated on 6 benchmark datasets and the efficiency of the results is compared with compared with the 5 existing clustering method namely K-Means, gravitational search algorithm (GSA), particle swarm optimization (PSO), grey wolf optimizer (GWO) and salp swarm algorithm (SSA). The results demonstrate that the proposed method surpassed the other considered methods in terms of best and mean fitness value.

Keywords: Clustering Method, Salp Swarm Algorithm, Optimization, Meta-Heuristic Algorithm.

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Kapil Sharma
Professor, Delhi Technological University, Kapil@iee.org
Ashish Kumar Tripathi
Assistant Professor, Jaypee Institute of Information Technology, Noida
Manju Bala
Assistant Professor, IP College Of Women, New Delhi
CRYPTANALYSIS OF DENIABLE AUTHENTICATION SCHEME BASED ON ELGAMAL SIGNATURE SCHEME

NIPUN BANSAL, ANUPAM LAKHANPAL

Abstract: Deniable Authentication scheme allows the participants to deny about their involvement in the transaction or the deal after the deal is over. Such a protocol finds its application in areas where two parties want to do a transaction but don’t want that either party can later claim that they have taken part in the deal. A lot of deniable authentication protocol has been prescribed in the past, mostly inspired by ElGamal signature scheme; one of the most simplest and elegant protocol. It is claimed that the proposed deniable encryption scheme is completely secure and is resistant to various attacks like KCI attack, masquerade attack, impersonating the receiver to verify the signature send. We demonstrate the cryptanalysis of the various deniable authentication protocol based on ElGamal based digital signature scheme and show the various attacks possible.

Keywords: Denial Authentication, Cryptanalysis, Non Interactive Deniable Authentication.

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Nipun Bansal
Assistant Professor, DTU, Delhi
Anupam Lakhanpal
Assistant Professor, Galgotias University, Greater Noida
VARIABLE-TO-VARIABLE RUN LENGTH ENCODING TECHNIQUE FOR TESTING LOW POWER VLSI CIRCUITS

ARUN S, DARWIN P

Abstract: The enhancement of integration capability in semiconductor technology requires a large amount of test data, resulting in an increase in memory, transition time and test time. In this paper, a novel lossless data compression technique is proposed to reduce test data, time and memory, based on variable to variable run length encoding scheme. In this scheme, a test data is partitioned into variable length test patterns and by applying compression algorithm, the bits are compressed into variable length codes. The encoding technique enhances the test data reduction with a limited number of code words. The compression technique is effective, especially when the runs of 0s and 1s in the test set are high and efficiently compress the data streams which is composed of runs of 0's and 1's. The variable to variable run length code algorithm is used to make changes in test vectors and adaptable for compressing precomputed test sets to test the embedded cores of System-on-chip (SOC). The decompression architecture for proposed technique was presented in this paper. Experimental results of ISCAS 85 and ISCAS 89 benchmark circuit’s results in the significant reduction of test data with better compression ratio.

Keywords: Pre-Computed Test Sets, Compression Codes, Decompression, Embedded Core Testing, SOC Testing.

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Arun S,
Professor, Chennai Institute of Technology,
Chennai, Tamil Nadu
aruns@citchennai.net

Darwin P
Professor, Chennai Institute of Technology,
Chennai, Tamil Nadu
darwin009@gmail.com