



Sri Lanka - Japan Collaborative Research

Book of Abstracts

21 October 2023



Sri Lanka - Japan Study Centre University of Peradeniya Sri Lanka



8th Conference on Sri Lanka – Japan Collaborative Research – 2023

Addressing global issues through collaboration and partnership

Book of Abstracts

Sri Lanka Japan Study Centre (SLJSC) University of Peradeniya, Sri Lanka

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8th Conference on Sri Lanka – Japan Collaborative Research, 2023

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Message from His Excellency the Ambassador of Japan

Sri Lanka-Japan Collaborative Research (SLJCR) - 2023 Conference

It is with great pleasure that I extend my warmest congratulations to the 8th Conference on Sri Lanka – Japan Collaborative Research – 2023, organized by the Sri Lanka – Japan Study Centre (SLJSC) at the University of Peradeniya, Sri Lanka

It is with great pleasure that I extend my warmest congratulations to the 8th Conference on Sri Lanka – Japan Collaborative Research – 2023, organized by the Sri Lanka – Japan Study Centre (SLJSC) at the University of Peradeniya, Sri Lanka.

Under the theme "Addressing global issues through collaboration and partnership," this conference serves as a beacon of intellectual exchange and partnership between our two nations. International collaborative research stands as the cornerstone of shared prosperity of all humanity, fostering the exchange of perspectives, knowledge, and wisdom across disciplinary boundaries and national borders.



The Conference on Sri Lanka-Japan Collaborative Research offers an invaluable platform to showcase the latest advancements and updates in collaborative efforts between Japanese and Sri Lankan researchers. It is my firm belief that the discussions held during this conference will not only highlight the progress made thus far but also inspire new avenues for collaborative research endeavors in the future. By fostering an environment of open dialogue and collaboration, we can collectively contribute to addressing global challenges and paving the way for future advancements.

May this conference be a testament to the enduring bond between our two nations and serve as a catalyst for even deeper collaboration and partnership in the years to come.

MIZUKOSHI Hideaki Ambassador of Japan

Message from the Vice-Chancellor

Professor M.D. Lamawansa

University of Peradeniya

Sri Lanka-Japan Collaborative Research (SLJCR) - 2023 Conference



I am delighted to share this message with you on the occasion of the Sri Lanka-Japan Collaborative Research (SLJCR) - 2023 conference.

The enduring friendship between Sri Lanka and Japan, forged since the post-World War II era, has been profound and mutually beneficial. Over the years, our collaboration has transcended cultural, religious, and economic boundaries. While the initial focus was on these aspects, our engagement has evolved to encompass the exchange of knowledge, technology, education, and research in recent times.

The 8th conference of SLJCR, meticulously organized by the Sri Lanka Japan-Study Centre, presents a significant opportunity for researchers, scholars, and ac-

ademics from both nations to disseminate new knowledge, share the latest research findings, and engage in meaningful discussions within their respective fields. Moreover, this gathering serves as a catalyst for fostering future collaborations.

I extend my sincere gratitude to the dedicated members of the Sri Lanka-Japan Study Centre for their commendable efforts in organizing the Sri Lanka-Japan Collaborative Research 2023 conference. Their unwavering commitment has played a pivotal role in bringing this event to success.

In closing, I wish all participants a memorable, enjoyable, and highly productive experience during the conference. May it contribute to the continued growth and strengthening of the ties between our two nations.

Professor M.D. Lamawansa Vice-Chancellor

Message from Conference Co-Chairs

Sri Lanka-Japan Collaborative Research (SLJCR) - 2023 Conference

We are honored to extend this message as Co-Chairs, marking the commencement of the inauguration and scientific sessions of the 8th International Conference on Sri Lanka-Japan Collaborative Research (SLJCR) 2023. This distinguished event is an annual event organized by the Sri Lanka-Japan Study Centre (SLJSC) at the University of Peradeniya, Sri Lanka.

Regrettably, the SLJCR conference had been on hiatus for the past three years due to the global challenges posed by the COVID-19 pandemic and the economic crisis faced by Sri Lanka. However, overcoming these obstacles, this year's conference will unfold virtually, a testament to the dedication and perseverance of Dr. Panduka Neluwala, Director of the SLJSC at the University of Peradeniya.

The SLJCR annual conference serves as a unique platform for scientists and students from Sri Lanka and Japan to convene, fostering connections with colleagues, research collaborators, and esteemed scientists for the purpose of disseminating their groundbreaking research findings.

The rapid advancements in technology and the nurturing of human resources have opened new vistas for local academia and researchers to actively engage in enhancing research capacity and the excellence of education. We are delighted to inform you that collaboration with Japanese scholars presents a unique advantage for Sri Lanka to gain insights into state-of-the-art technology, thus contributing to the achievement of sustainable development goals.

We extend our warmest hopes that all conference delegates will relish this exceptional occasion and seize the opportunity to explore new pathways for research collaboration, as well as the dissemination of innovative findings among their peers.

Our optimism abounds as we foresee the Sri Lanka Japan Study Centre (SLJSC) evolving to new heights in the coming years, aligning with the objectives set forth by the University of Peradeniya, Sri Lanka. In closing, we express our heartfelt gratitude and extend our best wishes for the resounding success of SLJCR-2023.



Prof. Yoshyuki Nagata (University of the Sacred Heart, Japan) Prof. Susiji Wickramasinghe (University of Peradeniya, Sri Lanka) Conference Co-Chairs

Message from Director Sri Lanka - Japan Study Centre

Sri Lanka-Japan Collaborative Research (SLJCR) - 2023 Conference

As the Director of the Sri Lanka-Japan Study Centre (SLJSC), I am immensely proud to present this message for the proceedings of the 8th International Conference on Sri Lanka-Japan Collaborative Research (SLJCR) 2023. This conference, a hallmark of our continuous commitment to fostering academic and research collaborations, stands as a testament to the enduring and evolving partnership between Sri Lanka and Japan.



The past few years have been challenging due to the global impact of the COVID-19 pandemic and various economic tribulations. However, these obstacles have only strengthened our resolve to push the boundaries of knowledge and collaboration. The shift to a virtual format for this year's conference is a reflection of our adaptability and dedication to maintaining the momentum of this significant academic exchange.

At the heart of SLJSC's mission lies the ambition to bridge the gap between diverse cultures, disciplines, and technologies. Our goal is to create an environment that not only encourages the sharing of knowledge and expertise but also nurtures long-lasting relationships between the academic and research communities of Sri Lanka and Japan. The SLJCR 2023 serves as a prime example of this vision, bringing together a multitude of researchers, scholars, and students to share their innovative findings and ideas.

The conference's rich tapestry of presentations and discussions is a clear indication of the vibrant and dynamic nature of our collaborative efforts. It is inspiring to see such a wide range of topics being explored, reflecting both our nations' dedication to addressing contemporary global challenges through research and innovation.

I would like to extend my deepest appreciation to everyone involved in the organization and execution of this conference, especially given the unique challenges posed by the current global context. Your hard work and dedication have been instrumental in the success of this event.

To all the participants, I encourage you to engage fully in the discussions and networking opportunities provided by this conference. Your contributions are not just for the advancement of your respective fields but also for the continued strengthening of the Sri Lanka-Japan partnership.

Looking ahead, the Sri Lanka Japan Study Centre is committed to expanding its scope and impact, continuously seeking new ways to contribute to the academic and research landscapes of both our nations. Let this conference be a stepping stone towards greater achievements and a brighter future for Sri Lanka-Japan collaborative research.

In closing, I wish you all a fruitful and enriching experience at SLJCR 2023 and look forward to witnessing the many accomplishments that will undoubtedly emerge from this gathering.

Dr. Panduka Neluwala

Director, Sri Lanka Japan Study Centre (SLJSC) University of Peradeniya

Sri Lanka- Japan Collaborative Research (SLJCR) Conference 2023 (Online) Programme

Time	Agenda						
9.00 - 9.05	Virtual lighting of the Oil lamp						
9.05 - 9.10	National Anthem						
9.10 - 9.15	Welcome address - Dr. Panduka Neluwala, Director Sri Lanka - Japan Study Centre						
9.15 - 9.25	Address by the Prof. M.D. Lamawansa, Vice-Chancellor, University of Peradeniya						
9.25 - 9.55	Keynote by the	e Prof. `	Yoshiyuki NAGATA				
9.55 - 10.00	Vote of Thank	s- Prof	. Susiji Wickramasinghe co-chair				
	End of the Inauguration Ceremony						
10.00 - 11.30	Technical Session 1: Morning						
	Chairnerso	n• Dr	Nuresh Franda Panelist Dr. Bimali Sanie	evani			
	Room: Virt	ual Ro	om 1				
	Time		Title	Dresonting			
	Time	ID	The	Author			
	10.00 - 10.10	2	ON-SITE DETECTION OF ASBESTOS BY STAINING THE SURFACE OF BUILDING MATERIALS USING TWO DYES	M. Tabata			
	10.10 - 10.20	22	PRODUCTIVE MANAGERS, PRODUC- TIVE BRANCHES, AND THE REWARDS. EVIDENCE FROM THE COOPERATIVE BANKS IN SRI LANKA	A.M.P. Aran- dara			
	10.20 - 10.30	12	THE EFFECTIVENESS OF EMOTIONAL INTELLIGENCE TRAINING WITH THE MODERATION OF SOCIAL AND ORGAN- IZATIONAL SUPPORT: THE CASE OF GOVERNMENT OFFICIALS IN SRI LANKA	O.K.I.M Opatha			
	10.30 - 10.40	9	EXPLORING THE PROMOTING FAC- TORS OF LOW CARBON TRANSPORTA- TION; A CASE STUDY OF TRUCK FLEET INDUSTRY OF JAPAN	Mudagei Nipuni Tharanga			
	10.40 - 10.50	6	IMPACT OF COVID-19 ON THE MARKET- ING STRATEGIES OF SMALL AND ME- DIUM ENTERPRISES IN JAFFNA DIS- TRICT	K. Anushiya			
	10.50 - 11.00	29	MULTINOMIAL LOGIT (MNL) AND NESTED LOGIT (NL) MODELING AP- PROACHES FOR MODE CHOICE DECI- SIONS OF TRAVELERS IN DEVELOPING COUNTRIES	R.LN. Vidurangana			
	11.00 - 11.30	Discu	ssion				
	Technical Session 2: Morning Chairperson: Prof. Kamala Liyanage, Panelist: Prof. Niel Alles						
	Room: Virtual Room 2						
	Time	ID	Title	Presenting Au- thor			

10.00 - 10.10	17	A COMPARATIVE ANALYSIS OF BRAIN NEURAL ACTIVATION PATTERNS DUR- ING READING JAPANESE AND SIN- HALA LETTERS: INSIGHTS INTO LAN- GUAGE PROCESSING	W.M.D.T.A. Wal- pola		
10.10 - 10.20	20	THE ROLE OF COVID-19 VACCINA- TIONS IN DRIVING ECONOMIC GROWTH	I.W. Rathnayaka		
10.20 - 10.30	11	QUALITY OF WORK LIFE AND EM- PLOYEE PERFORMANCE: EVIDENCE FROM THE APPAREL INDUSTRY IN SRI LANKA	M.H.S. Dilrukshi		
10.30 - 10.40	24	EFFECT OF ENERGY AND MACRONU- TRIENT INTAKE DURING EARLY PREG- NANCY ON LARGE-FOR-GESTATIONAL AGE BABIES	D. Ambagaspitiya		
10.40 - 10.50	16	ENVIRONMENTAL ENRICHMENT FOR DEVARIO MALABARICUS (GIANT DANIO) IN LABORATORY CONDITIONS	H.M.M. Madu- shani		
10.50 - 11.00	30	RAINFALL TREND ANALYSIS IN MI- OYA RIVER BASIN	L.T. Wickrama- ratne		
11.00 - 11.30	Discu	ssion			
Technical Sess	sion 3:	Morning			
Chairperson: Prof. Susiji Wickramasinghe, Panelist: Dr. Panduka Neluwala Room: Virtual Room 3					
Room: Virtua	I Room	13			
Room: Virtua Time	I Room ID	Title	Presenting Au- thor		
Room: Virtua Time 10.00 – 10.10	I Room ID 19	Title THE CAREER GUIDANCE FOR HIGH SCHOOL STUDENTS LEARNING JAPA- NESE AS A FOREIGN LANGUAGE IN SRI LANKA	Presenting Au- thor Shirani N.Ko- lambage		
Room: Virtua Time 10.00 – 10.10 10.10 – 10.20	ID 19 23	Title THE CAREER GUIDANCE FOR HIGH SCHOOL STUDENTS LEARNING JAPA- NESE AS A FOREIGN LANGUAGE IN SRI LANKA AN ANALYSIS OF HIGHWAYS SECTOR PROCUREMENTS IN SRI LANKA BY FO- CUSING ON FACTORS AFFECTING TIME AND COST OVERRUNS	Presenting Au- thor Shirani N.Ko- lambage B.G.P.N.Dil- shari		
Room: Virtua Time 10.00 - 10.10 10.10 - 10.20 10.20 - 10.30	ID 19 23 25	Title THE CAREER GUIDANCE FOR HIGH SCHOOL STUDENTS LEARNING JAPA- NESE AS A FOREIGN LANGUAGE IN SRI LANKA AN ANALYSIS OF HIGHWAYS SECTOR PROCUREMENTS IN SRI LANKA BY FO- CUSING ON FACTORS AFFECTING TIME AND COST OVERRUNS TESTING AND MODIFYING THE EXIST- ING GROUNDNUT THRESHING MA- CHINE	Presenting Au- thorShirani N.Ko- lambageB.G.P.N.Dil- shariA.R.M. Zahran		
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Room: Virtua Time 10.00 – 10.10 10.10 – 10.20 10.20 – 10.30 10.30 – 10.40 10.40 – 10.50	I Room ID 19 23 25 27 28	Title THE CAREER GUIDANCE FOR HIGH SCHOOL STUDENTS LEARNING JAPA- NESE AS A FOREIGN LANGUAGE IN SRI LANKA AN ANALYSIS OF HIGHWAYS SECTOR PROCUREMENTS IN SRI LANKA BY FO- CUSING ON FACTORS AFFECTING TIME AND COST OVERRUNS TESTING AND MODIFYING THE EXIST- ING GROUNDNUT THRESHING MA- CHINE ESTIMATION OF RESERVOIR WATER LEVELS USING SATELLITE DATA PRODUCTS EXPLORING THE PRESENCE OF JAPA- NESE CULTURE IN CLASSICAL TAMIL LITERATURE	Presenting Au- thorShirani N.Ko- lambageB.G.P.N.Dil- shariA.R.M. ZahranA.R.M. ZahranS.Thushanth		
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ON-SITE DETECTION OF ASBESTOS BY STAINING THE SURFACE OF BUILDING MATERIALS USING TWO DYES

M. Tabata^{1*}, N. Gunawardhana²

¹Saga University, 1-Honjo-machi, Saga, 840-8502 Japan. ²Sri Lanka Technological Campus, Padukka, Sri Lanka *Correspondence E-mail: <u>tabatam@cc.saga-u.ac.jp</u>, TP: +81-0952-31-8460

Abstract: Whenever disaster occurs or old houses are demolished, large quantities of building materials are discharged. These discarded building materials are at risk of containing asbestos. To prevent damage caused by asbestos and to classify and reuse waste building materials, it is required to rapid confirmation of asbestoscontaining and non-asbestos-containing building materials at temporary disaster storage sites or demolition sites. We have developed a new method to detect asbestos by staining the surface of building materials with methylene blue (MB) and erythrosine (RED-3) in order to quickly detect asbestos-containing building materials at disaster or demolition sites. Asbestos was easily detected by the colour and characteristic shape of the images observed under a stereomicroscope after staining. The type of asbestos was confirmed to be chrysotile by polarized light microscopy, X-ray diffraction patterns, and Raman spectra. The percentage of the area of asbestos at the surface of building materials was also determined by an image analyser after the dye staining, and the distribution percentage of asbestos was elated to its total concentration in the building material. Threedimensional X-ray computed tomography images showed that asbestos was mainly distributed at the surface of building materials. This result suggests that asbestos at the surface of debris of building materials is more easily and sensitively detected than the official method recommended by the Japanese government. The present method was applied to detect and determine asbestos in debris of building materials wasted at temporary storage sites after a disaster and on the wall of a building in use. Therefore, this method can contribute to the schooling classification of asbestos-containing and non-asbestos-containing building materials at disaster and demolition sites, as well as to inspections for the detection of asbestos-containing building materials in buildings or houses to be demolished. There is no risk of fibrous asbestos becoming airborne during the measurement because building-material samples are not crushed.

Keywords: Asbestos; Detection; Staining; Dyes; Waste building materials

PRODUCTIVE MANAGERS, PRODUCTIVE BRANCHES, AND THE REWARDS. EVIDENCE FROM THE COOPERATIVE BANKS IN SRI LANKA

Arandarage Mayura Prasad Arandara^{1*}, Shingo Takahashi²

¹ Graduate School of Humanities and Social Sciences, Hiroshima University, Hiroshima, Japan
 ² School of Economics and Management, University of Hyogo, Nishi Ward, Kobe, Hyogo, Japan
 *Correspondence E-mail: arandaramp@gmail.com, TP: +94714241802

Abstract: Using branch-manager linked data from the Cooperative Rural Banks (CRBs) of Sri Lanka, we investigate the source of branch performance differences. Despite the significant variation in the local conditions of branches, we found that managerial talent matters significantly. Manager effects explain 35% of the raw variation in the branch profit per worker and 45% of the raw variation in the branch-level non-performing loan ratio (NPLR). Branch effects explain a larger share of the variations in branch profit per worker (69%), but explain a smaller share of variation for NPLR (41%). We did not find evidence that branch managers are rewarded for their real contributions, measured by the estimated manager effects, via salary increase. Rather, they are rewarded merely for the raw performance of their branches. However, managers are rewarded with improved branch assignments when they increase profit-per-worker. A one standard deviation improvement in manager effects would increase the probability of being assigned to the top quartile branches by 8.7%.

Keywords: Branch effects; Cooperative banks; Incentive pay; Manager effects; Mixed effect estimations

The complete version of the record of this manuscript has been published and is freely available in APPLIED ECONOM-ICS 27 December 2022 <u>https://www.tandfonline.com/doi/pdf/10.1080/00036846.2022.2155609</u>

THE EFFECTIVENESS OF EMOTIONAL INTELLIGENCE TRAINING WITH THE MODERATION OF SOCIAL AND ORGANIZATIONAL SUPPORT: THE CASE OF GOVERNMENT OFFICIALS IN SRI LANKA

O.K.I.M Opatha^{1*}, Yoshi Takahashi¹

¹ Graduate School of Humanities and Social Sciences, Hiroshima University, Higashi Hirpshima, Japan *Correspondence E-mail: ishara.opatha@gmail.com, TP: +817084926877

Abstract: Emotional Intelligence (EI) is the ability to perceive, control, and behave morally in human relationships. Hence in contemporary organizational settings, there is a considerable emphasis on investing significantly in EI training to cultivate and foster EI competencies among employees since it enhances organizational performance in different aspects. To optimize the allocation of resources including finance, time, materials, and human resources in EI training, systematic academic research on the effectiveness of EI training is yet to be conducted. The inconclusive results of existing research, create a barrier to resolving the fundamental inquiry concerning the trainability of EI. Therefore, this study aimed to assess the effectiveness of EI training through its impact on learning and transfer outcomes, following recommendations of prior research. Additionally, the role of social and organizational support is relatively less explored as a moderator in the transfer mechanism. Consequently, we evaluated the impact of EI training on training outcomes and investigated the role of social and organizational support as moderators on the relationship between EI Training and its outcomes, using an experimental and longitudinal approach to address the research gap. An experimental design employed a randomized controlled trial to contrast training outcomes in treatment and control groups. Due to the longitudinal approach, data was periodically collected before, immediately after, one month and three months after the training from 176 officials in Sri Lanka's Western Provincial Council. We employed independent samples t-test, ANOVA, multiple comparisons, and hierarchical regression using the Hayes' Process macro in SPSS for data analysis. Results showed that EI training positively affected the learning and training transfer outcomes, and social and organizational support strengthened the relationship between EI training and its outcomes. With this empirical evidence, this study bridges the void in the literature regarding EI and allows practitioners to obtain substantiation of its tangible benefits in organizations.

Keywords: Training Effectiveness; Learning, Training Transfer; Emotional Intelligence; Social and Organizational Support

EXPLORING THE PROMOTING FACTORS OF LOW CARBON TRANSPORTATION; A CASE STUDY OF TRUCK FLEET INDUSTRY OF JAPAN

Mudagei Nipuni Tharanga1*, Kentaka Aruga1

¹Saitama University, 255 Shimo-Okubo, Sakura-ku, Saitama City, Japan Email:nipunitharanga92@gmail.com, TP:+81 70 8562 8542

Abstract: The global climate crisis is currently one of the most pressing issues that needs to be addressed, primarily caused by anthropogenic greenhouse gas emissions. Therefore, several studies emphasized the importance of maintaining the balance between the environment and business practices for sustainable development through green economy phenomena. This study explored factors promoting green transportation that mainly reduce the CO2 emission from truck fleets in the logistics industry by conducting an online survey for 169 trucking companies in Japan. As a theoretical framework, institutional and corporate environmental management theory (CEM) were consumed to develop hypotheses based on the factors: environmental management strategy factor, mandatory and normative pressure factor, and key stakeholders' pressure factor for the study. Applying the ordered probit regression model, the relationship between three factors and low-carbon transportation practices was examined and the coefficient results were respectively 0.596 with a significance of 0.002, 0.064 with an insignificance and -0.042 with an insignificance. Therefore, the study identified the environmental management strategy factor as the most influential factor for promoting low-carbon transportation in the fleet logistics industry of Japan while revealing vehicle classification, choosing the proper mode of transportation, and monitoring driving mileage as the most successful practices. These findings will aid the fleet industry in becoming green in logistics worldwide.

Keywords: Green logistics; Low carbon transportation; Fleet industry; Ordered probit model; Institutional theory; CEM theory

IMPACT OF COVID-19 ON THE MARKETING STRATEGIES OF SMALL AND ME-DIUM ENTERPRISES IN JAFFNA DISTRICT

K. Anushiya^{1*}, A. Mithursan², H. Zhang³

¹University of Sri Jayewardenapura, Sri Lanka ²University of Peradeniya, Sri Lanka ³University of Saitama, Japan *Correspondence E-mail: mg17085@mgt.pdn.ac.lk, TP: +94778520481

Abstract: The outbreak of COVID-19 pandemic in early 2020 had a profound impact on fluctuations in marketing, of Small and Medium Enterprises (SMEs) and compelling businesses and brands to re-evaluate their thinking about present and future marketing strategies to maintain a steady stream of income. While marketing strategies currently seek to strike the right tone during a global health emergency, the future portends market alteration, increased competition, and a demand for creative and aggressive marketing practices for SMEs. There is a theoretical gap identified in analyzing the impact of marketing strategies on SMEs in the Jaffna district. SMEs are major contributing sectors in a global economy, but the nature of the reality is different in Sri Lanka, especially in the Jaffna district. This study aimed to identify the marketing impact of COVID-19 on SMEs in the Jaffna District in Sri Lanka. A qualitative method was used to collect data from 30 SMEs in Jaffna District. The purposive sampling technique was used to identify the respondents involved in marking activities in SMEs. Thematic analysis was employed to identify the marketing impact of COVID-19 on SMEs. Finally, five themes such as product, price, promotion, distribution, people, process, physical evidence, and consumer behavior impacts on SMEs in Jaffna district were identified through data analysis. The findings of the study show that COVID-19 mitigating protocols and mechanisms caused to increase the economic and individual costs which have a negative influence on the SMEs operating in Jaffna. SMEs are economically fragile and facing several difficulties, including a lack of materials, a decline in demand for their products and services locally and globally, difficulties in paying back loans and interest, struggling with liquid cash (including issues with payroll and utility bills), difficulties in recalling employees to work, and a lack of new orders. Moreover, many SMEs were thinking of temporarily closing down. SMEs adopt the following marketing strategies to manage the impact of COVID-19 on their marketing activities. The periphery of Jaffna and its sensitive marketing in SMEs can be achieved by adapting to evolving market dynamics. Data analysis from the informant's speech remarks revealed the following sub-themes under the marketing strategies such as Relationship marketing strategies, Case-related marketing strategies, Social marketing strategies, and Influential marketing strategies. The capacity development programme for SMEs is one of the finest policy implementations initiated by the Central Bank of Sri Lanka to re-build robust SMEs.

Keywords: COVID-19, Marketing Strategies, SMEs, Consumer Behavior, Jaffna District

MULTINOMIAL LOGIT (MNL) AND NESTED LOGIT (NL) MODELING APPROACHES FOR MODE CHOICE DECISIONS OF TRAVELERS IN DEVELOPING COUNTRIES

R.L.N. Vidurangana^{1*}, H.A.R.N. Vindyani¹, W.R.S.S. Dharmarathna¹

¹Department of Civil Engineering, Faculty of Engineering, University of Peradeniya, Peradeniya, Sri Lanka *Correspondence E-mail: e17361@eng.pdn.ac.lk, TP: +94728729843

Abstract: Number of methods have been tested globally for forecasting travel mode choice, with discrete choice modeling approaches such as Multinomial Logit Model (MNL), Nested Logit Model (NL), and Mixed Multinomial Logit Model (MMNL). Among these, MNL and NL approaches are the most prevalent. The mathematical form of the MNL model is determined by the assumptions made regarding the error components as they are extreme value (or Gumbel) distributed, identically & independently distributed across alternatives and across observations/individuals. However, there is a possibility that these assumptions may violate among travelers in developing countries as it is hard to describe their behavior by a common utility function. The NL model allows partial relaxation of the assumption of independence among random components of alternatives. Thus, this study aims to compare MNL and NL approaches for estimating mode choice parameters. Study collects comprehensive data, including trip-specific information, socio-economic data, and household details, through Sri Lanka by online (830) and face-to-face (705) questionnaires. Travel time was selected as the parameter to be estimated in both modeling approaches. Both models are developed, and a detailed comparison is made between MNL and NL models to evaluate their respective performances. According to the survey data, mode choice preferences indicate that 46% use buses while 19% choose motorbikes, 12% prefer trains, and 11% select cars. The remaining 12% distributes as 4% use vans or Jeeps, (3%) three-wheelers, (2%) each for bicycles and walking, with the remaining 1% utilizing taxis. The study delves into the complex decisionmaking process behind mode choice behavior in transportation, with a particular emphasis on the attribute of total travel time. It investigates the preferences of individuals among nine distinct travel modes by considering travel cost and travel distance as attributes. Results highlight a notable significance of total travel time in influencing mode selection. Understanding the weight of this attribute in decision-making holds valuable implications for urban planning, policy development, and the optimization of transportation systems.

Keywords: Multinomial Logit model; Nested Logit model; Mode choice; Parameter estimation; Travel behavior

A COMPARATIVE ANALYSIS OF BRAIN NEURAL ACTIVATION PATTERNS DUR-ING READING JAPANESE AND SINHALA LETTERS: INSIGHTS INTO LANGUAGE PROCESSING

WMDTA Walpola^{1*}, S Yoshida¹, A Senoo¹

¹Department of Radiological Sciences, Graduate School of Human Health Sciences, Tokyo Metropolitan University, Tokyo, Japan *Correspondence E-mail: thishuliwalpola@gmail.com, TP: +817033188587

Abstract: Different languages have perceptible linguistic traits as well as writing systems. By comparing the brain function between languages, can glean valuable insights into the universality and diversity of language processing in the human brain. Purpose: The main goal of this study is to investigate the brain function of individuals reading Japanese and Sinhalese separately and to understand the neural mechanisms and regions of brain activation specific to each of these two languages. Method: A total of 42 healthy subjects (21 native Sinhalese; male:6 & female:15; mean age 30±4.2 and 21 native Japanese; male:14 & female:7; mean age 24.6 ± 7.6) participated in the study. They were given simple novels in their respective languages for silent reading inside the MRI scanner (3.0 T SIGNA Premier). The same protocol was used for Image acquisitions with 3D-T1W1 and fMRI, sequence: GRE EPI TR: 1000(ms). The BOLD response was obtained using a block design of 3 blocks per run, with each task block containing 320-350 characters for reading for both groups. Results: Neural activation patterns were analyzed using SPM12 software. In Japanese readers, there were significant neural activations in the left occipital fusiform gyrus, right middle temporal gyrus, and left superior parietal lobule (p<0.001, k=21). Correlation analysis showed significant activation in the left precentral gyrus, right and left lingual gyrus, and right superior frontal gyrus in Sinhala readers than in Japanese (p<0.05). **Discussion and conclusion:** Though the contribution of the precentral gyrus in covert reading was ambiguous in previous studies, the significant activation in the left precentral gyrus during Sinhala reading emphasized a strong fact that inner sound coordination is required in covert reading. Understanding these differences will be utilized to develop fast reading techniques and second language learning methods as the future perspectives of this study.

Keywords: fMRI; Sinhala reading; Language processing, Silent reading; Neuroimaging

THE ROLE OF COVID-19 VACCINATIONS IN DRIVING ECONOMIC GROWTH

I.W. Rathnayaka¹, M.H.S. Dilrukshi², I.S.Jayathunga³

¹ School of Business, University of Southern Queensland, Australia and Department of Economics, University of

Colombo, Sri Lanka

²Graduate School of Economics, Kyushu University, Japan and Department of Economics, University of Colombo, Sri Lanka

³Department of Economics, University of Colombo, Sri Lanka

*Correspondence E-mail: wasana@econ.cmb.ac.lk, TP: +61432259253

Abstract: The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), a highly contagious virus, has unleashed a worldwide pandemic, leaving in its wake profound sickness and mortality. COVID-19 vaccines play a crucial role in responding to the pandemic as they provide protection against severe illness and death. This study examines the effects of COVID-19 vaccine rollouts on economic growth by analyzing a panel of data from 20 countries including Sri Lanka and Japan between 2020 and 2022 including both developed and developing countries. The motivation behind this research stems from the multifaceted effects of ongoing COVID-19 vaccine rollouts on global economies. The study uses a random effects model to explore the relationship between vaccination rates and economic growth. Economic growth is a primary economic objective for every country. This model investigates the effect of COVID-19 vaccination on GDP growth rate during the pandemic period by utilizing various control variables. The study reveals that in the econometric model, 47% of the variance in GDP is explained by the model (F = 2.79, P < 0.05). The two variables that are not significant are gross fixed capital formation and government expenditure, which had a significant positive impact on GDP. An increase of 1% in COVID-19 vaccination rate leads to a 0.03% increase in GDP growth. In addition, a 1% increase in the inflation rate, trade openness, and foreign direct investment net inflows results in a GDP growth increase of 0.0042%, 0.0046%, and 0.0358%, respectively. One limitation of this research is that it does not account for the spillover effects of government responses during the pandemic, such as lockdowns and social restrictions, which can significantly impact GDP growth. The implications of the findings suggest that national authorities should prioritize the accessibility and affordability of COVID-19 vaccines as a public health good to help counter the threat of the pandemic to global public health.

Keywords: Covid-19 Vaccination; Economic Growth; Inflation; Unemployment; Health policy

QUALITY OF WORK LIFE AND EMPLOYEE PERFORMANCE: EVIDENCE FROM THE APPAREL INDUSTRY IN SRI LANKA

M.H.S. Dilrukshi^{1*}, I.W.Rathnayaka², J.M.I.S. Jayathunge³, M.H.C. Dewinda⁴

¹Graduate School of Economics, Kyushu University, Japan and Department of Economics, University of Colombo,

Sri Lanka

² School of Business, University of Southern Queensland, Australia and Department of Economics, University of

Colombo, Sri Lanka

³Department of Economics, University of Colombo, Sri Lanka ⁴Global Business Program, University of West Scotland, Scotland

*Correspondence E-mail: saumva@econ.cmb.ac.lk, TP: +8107075860026

Abstract: Quality of Work Life (QWL) policies are now an integral part of business strategies, ensuring employee retention, productivity, and overall organizational success. This trend extends to Sri Lanka's apparel industry, a prominent economic contributor toward investment, exports, and economic growth. Consequently, the study was carried out to examine the employees' satisfaction with QWL variables and their relationship with employee performance. Employee performance and satisfaction with the QWL characteristics – namely, job accessibility, job stability, flexibility, workload, opportunities for training and development, occupational health and safety, and support from supervisors and co-workers were assessed using a five-point Likert scale questionnaire. The study used primary data drawn from a sample size of 177 respondents employed in various textile and apparel factories, aiming to explore the potential relationship between QWL and employee performance. The objective is to establish a hypothesis and determine whether this correlation is statistically significant or not. The value of Cronbach's alpha was reported as 0.805, ensuring the model's reliability. The study employed Spearman's Correlation technique to test the hypothesis and confirms that all quality of work-life variables positively related to employee performance, consistent with prior research. Spearman Rho's (r) value of support from supervisors and support from colleagues indicates a strong and significant relationship with employee performance. The study further discovered that there is a moderate and significant relationship between employee performance and training and development, as well as the flexibility of working. In contrast, health and safety and accessibility have a weak influence on employee performance. It's worth noting that there exists a significant, yet very weak correlation between job security and employee performance. The findings of the study emphasize that the establishment of a work atmosphere that fosters positive interactions and teamwork between colleagues is crucial. Implementation and enforcement of guidelines that ensure employee wellness, can also have a positive influence on employee effectiveness and overall work contentment.

Keywords: Quality of work-life; Employee Performance; Job Security; Job Accessibility; Job Satisfaction

EFFECT OF ENERGY AND MACRONUTRIENT INTAKE DURING EARLY PREG-NANCY ON LARGE-FOR-GESTATIONAL AGE BABIES

D. Ambagaspitiya^{1*}, N. Alles¹

¹Department of Biochemistry, Faculty of Medicine, University of Peradeniya, Sri Lanka *Correspondence E-mail: dineshaambagaspitiya@ymail.com, TP: +94769458484

Abstract: Large-for-gestational age (LGA) babies is defined as birth weight (BW) >3.5 kg after completion of 37-40 weeks of gestation. This emerging health concern is associated with potential development of various non-communicable diseases later life. Despite the need for increased maternal energy and macronutrient consumption during pregnancy to support both maternal and foetal metabolic demands, influence of maternal energy and macronutrient intake during initial stages of pregnancy on foetal growth remains uncertain. This study was conducted with the aim of investigating the impact of energy and macronutrient intakes during early pregnancy on LGA babies. A nested case-control study was conducted at Teaching Hospital, Peradeniya, recruiting 85 mothers who delivered LGA babies, and a control group of age, body mass index and parity matched 85 mothers who delivered normal BW babies; out of a total sample of 539. Dietary intake was assessed using a validated food frequency questionnaire, during 8^{th} to 20^{th} weeks of gestation and daily energy and macronutrient intake during one month period was assessed by a nutrient analysing software. Independent t test was used to compare difference in mean energy intake and p < 0.05 considered significant. A statistically significant difference was observed between mean energy-intake of mothers who delivered LGA babies (2644.8±540.7 Kcal/day) and mother who delivered normal BW babies (2384.6±481.3 Kcal/day) (p<0.01, 95% confident intervals: 104.7-415.6). The mean protein intake was higher among mothers who delivered LGA babies (94.6±23.6 g/day) than mothers who delivered normal BW babies (89.9±23.0 g/day), however difference was not statistically significant. A significant difference was not observed between the maternal carbohydrate (652.2±127.0 g/day versus 653.3±123.2 g/day), and fat intakes (66.82±20.4 g/day versus 66.1±21.7 g/day) between the mothers who delivered LGA babies and mother who delivered normal BW babies. Higher energy intake during the first half of pregnancy exhibited a significant influence on delivering LGA babies.

Keywords: Pregnancy nutrition; Dietary energy intake; Protein intake

ENVIRONMENTAL ENRICHMENT FOR Devario malabaricus (GIANT DANIO) IN LA-BORATORY CONDITIONS

H.M.M. Madushani¹, D.P. Dias¹, N.P.P. Liyanage¹, S. Asakawa², S. Kinoshita², S.S.S. De S. Jagoda³, D.P.N. De Silva^{1,4}*

¹Department of Animal Science, Faculty of Animal Science and Export Agriculture, Uva Wellassa University, Badulla, Sri Lanka

²Department of Aquatic Bioscience, Graduate School of Agricultural and Life Sciences, The University of Tokyo, Japan ³Center of Aquatic Animal Disease Diagnosis and Research, Faculty of Veterinary Medicine and Animal Science, University of Peradeniya, Kandy, Sri Lanka

⁴Department of Chemistry, Faculty of Science, University of Colombo, Sri Lanka *Correspondence E-mail: <u>prasadi@chem.cmb.ac.lk</u>, +94704499090

Abstract: The cyprinid genus *Devario* are freshwater fishes which are among the mostly encountered fishes in Sri Lanka and over 40 species of them can be found in South and Southeast Asia. *Devario malabaricus* (Damkola saalaya/Giant danio) is a surface feeder closely related to zebrafish which is having comparatively larger body size than *Danios*. Although it can be used as a model organism similar to zebrafish, their growth performance was less investigated under laboratory conditions. Hence, this study provided environmental enrichment methods to determine the performance of *Devario* spp. Adult *Devario malabaricus* (n = 24) were captured from "Badulu-oya stream", Sri Lanka which acclimatized for two weeks at laboratory (six fish/50 L tank, temperature 25 – 28 °C, pH 6.6 – 8.0). Two experimental tanks (n=6x2) received live feed (*Daphnia magna*) in addition to the commercial feed and provided artificial rain for an hour per day. The two control tanks (n=6x2) received only commercial feed without artificial rain. The initial average weights and lengths of the fish in environment enriched tanks and control tanks were 3.95 g, 5.66 cm and 6.61 g, 6.37 cm respectively. After two months of environmental enrichment, the body weight and length gains in treatment and control tanks were 0.98 g, 0.74 cm and 0.64 g, 0.68 cm respectively. This study shows that *Devario* spp. growth performance is higher when they are kept in enriched environment at laboratories.

Keywords: Giant danio; Model organism; Environmental enrichment; Fish growth

RAINFALL TREND ANALYSIS IN MI-OYA RIVER BASIN

L.T. Wickramaratne^{1*}, H.J.S Hasaranga¹, M.M.G.T De Silva¹

Faculty of Engineering, University of Peradeniya, Peradeniya *Correspondence E-mail e17391@eng.pdn.ac.lk, TP: +94-70-2182454

Abstract: Trend analysis is a process of analyzing historical data to identify patterns and trends over time. This research focuses on the analysis of rainfall data in the Mi-Oya river basin to identify daily, seasonal, and annual trends. Mi-Oya river basin was frequently flooded during recent past and authors tried to investigate whether these frequent floods are due to the variations of rainfall patterns. Further, Mi-oya river basin is lacks of comprehensive studies to identify the rainfall variations and trends.

A commonly used non-parametric numerical method called the Mann-Kendall method with Sen's slope estimator was employed for the analysis. Rainfall data obtained from the Department of Meteorology for five rainfall gauging stations namely Puttalam, Anamaduwa, Madiyawa, Palavi, Thabbowa were used with 30 years data 1990-2019. SPSS software is utilized for missing data completion with multiple imputation technique as the missing percentage is less than 10%. RStudio was used for the Mann-Kendall and Sen's slope calculations. The analysis of annual rainfall patterns clearly indicates a consistent upward trend across nearly all monitoring stations, providing insights of further increase of rainfall. Further, the results indicate that in the proximity to coastal areas results in a significant reduction in the observed rainfall trend. Examination of the data shows an extension of the North-Eastern monsoon from December to March, deviating from its previous timing of December to February. This alteration suggests a shift in the inter-monsoon period, potentially influenced by long-term climate changes.

The results of this research can be used to identify patterns in rainfall within the study area, which can be instrumental in effective agriculture and water resource management. Overall, this study provides valuable insights into rainfall trends in the Mi-Oya river basin, offering a foundation for evidence-based decision-making in various sectors dependent on reliable precipitation information.

Keywords: Rainfall Trend; Mi-Oya; Mann-Kendal; Sen's Slope

THE CAREER GUIDANCE FOR HIGH SCHOOL STUDENTS LEARNING JAPANESE AS A FOREIGN LANGUAGE IN SRI LANKA

S.N. Kolambage^{1*}, S.K.A.Lokugamage²

¹University of Colombo, ²University of Sri Jayewardenepura *Correspondence E-mail: 24shirani@gmail.com, TP: 0714468727

Abstract: Sri Lanka has begun to experience a significant Japanese language learner incline. If the number of Japanese as a Foreign Language (JFL) learners increase, the number of higher education opportunity seekers and employment seekers related to Japan increases as well. Is sufficient career guidance available for high school JFL learners in Sri Lanka? The main objectives of this study were to identify the existing situation in the career guidance among high school JFL learners in Sri Lanka and to propose appropriate recommendations. The research is based on a qualitative interview study of three officers at Ministry of Education, Provincial Department of Education and Zonal Department of Education respectively. Participants were selected purposefully from the policy maker level of the relevant public sector institutions since they play very significant role in implementation of education system based on their decisions. The collected data has been qualitative. The results of the study show that: there was neither proper mechanism nor proper involvement at Ministry level of education for high school JFL learners. The research also found lack of establishing linkages among the schools. Many career guidance activities were conducted by external organizations, past pupil associations etc. At schools no progress review meetings related to career guidance, no regular monitoring of the effectiveness of career guidance and no dissemination of corrective feedback given to schools. On the bases of these findings it was recommended that the Ministry of Education must engage with its' strength for the proper functioning for career guidance among high school JFL learners. Career guidance suggested by the study are appointing a national level expert in career guidance related to Japan, constant coordinating with JFL learners' schools and regular discussions of career guidance and progress etc.

Keywords; Career guidance, High school students, Japanese as a Foreign Language, World of work related to Japan, Higher education opportunities

AN ANALYSIS OF HIGHWAYS SECTOR PROCUREMENTS IN SRI LANKA BY FO-CUSING ON FACTORS AFFECTING TIME AND COST OVERRUNS

B.G.P.N.Dilshari¹, Hideaki Tanaka¹,

¹Meiji University,1 Chome-1 Kanda Surugadai, Chiyoda City, Tokyo 101-0062, Japan. *Correspondence E-mail:nelumdilshari@gmail.com

Abstract: The public procurement process in Sri Lanka has undergone several issues resulting time and cost overruns. Majority of procurements are awarded 6 months to 3 years delay and more than 10% of cost overrun from its initial estimates in ministries of highways, irrigation, health and defense etc. Among those, Highway projects are significant in the current development process in Sri Lanka; therefore asses the highway procurements by focusing on factors affecting time and cost overruns will enable the government to respond for overcoming the delay and cost overrun in highway procurements.

The objective is to analyze factors affecting time and cost overruns of highway sector procurements by using an established set of factors. Accordingly, two research questions are, 'what are the commonly identified factors observed in literatures used to analyze the time and cost overruns in public procurements?' and 'how those factors affect time and cost overruns in highways sector procurements in Sri Lanka?'

Three types of data sources; international organization reports, journal articles and ministry of highways procurement meeting minutes are used to select factors and factors are visually examined. For the analysis, data were collected from two highway projects using a structured questionnaire and key informants interviews by three informants. Data consist of Likert scores for the factors against two procurements and text information. Content of interviews and project document data were analyzed using qualitative content summarizing, explication, and structuring.

From the (10) factors, only eight (8) factors affected time and cost overruns of the procurements. Among those, 'Inadequate budget allocation for procurement preparedness activities', 'Inadequate cash release according to annual budget estimates' and 'lack of sufficient procurement officers' are the most affecting factors to the time and cost overruns of two highways procurements according to the Likert scale scores.

Keywords: Highways; Procurements; Factors; Time overrun; Cost overrun

TESTING AND MODIFYING THE EXISTING GROUNDNUT THRESHING MACHINE

A.R.M. Zahran^{1*}, S. Likirthan², K. Nimal¹, S.D.R. Lakmal¹, C. Bopeththa¹, Y.N.S. Wijewardana¹

¹Department of EngineeringTechnology, Faculty of Technological Studies, Uva Wellassa University of Sri Lanka, Passara Road, Badulla.

> ²Hayleys Agriculture Holdings Limited, Colombo, Sri Lanka. *Correspondence E-mail: bet18082@std.uwu.ac.lk, TP: +94 770 348 403

Abstract: Groundnut (*Arachis hypogaea*) commonly known as peanut, is mainly cultivated in agricultural areas in Sri Lanka. Groundnut threshing, which involves removing the pods from the plant, plays a vital role in post-harvest management. Manual methods are inefficient, high labour, cost, and time-consuming. The objective of this research is to test and modify an existing groundnut threshing machine. Specific objectives are (i) to modify the structure of the machine after reviewing the SolidWorks design, (ii) to reduce groundnut separation time, and (iii) to minimize the mixing of unwanted dust particles during threshing. A machine was fabricated based on a three-dimensional conceptual model that is incorporated with field visits and testing results of an existing groundnut threshing machine. The modified groundnut threshing machine is powered by a tractor, and it was rigorously tested using both four-wheel and two-wheel tractors. However, considering the economic aspect, the superior efficiency and effectiveness of the machine achieved when powered by two-wheel tractor (Power Tiller). And the speed of machine threshing drum is 240 rpm, the average threshing performance is 26.29 Kg/h, and the threshing efficiency is 98.96 %. The modified drum showed the lowest broken pods with an average damage percentage is 13.18 %, and an average impurity percentage of 3.72 % was obtained. After some optimization, the threshing efficiency of this machine can archive 40 Kg/h to 50 Kg/h. And finally, the testing result shows this groundnut threshing machine is suitable for small-scale groundnut farmer's requirements. Further, field testing and performance evaluations are needed in future development of the machine.

Keywords: Groundnut threshing machine; Agricultural mechanization; Farm machinery; post-harvest management.

ESTIMATION OF WATER ELEVATION USING SATELLITE DATA

J.M.I Nawoda¹, A.A.D.C Madumalsha^{1*}, P. Neluwala¹

¹Department of Civil Engineering, Faculty of Engineering, University of Peradeniya, Peradeniya *Correspondence E-mail: e17197@eng.pdn.ac.lk, TP: + +94 76 711 9978

Abstract: Reservoirs quietly play a crucial role in ensuring the availability of local water resources, supporting agriculture, and safeguarding ecosystems across diverse regions. While satellite altimetry, a technology that measures water levels from space, has increasingly emerged as a sophisticated yet cost-effective solution for long-term water level monitoring, it has predominantly focused on larger lakes and reservoirs exceeding 1 square kilometer on a global scale. Smaller reservoirs, which are often overlooked, have been the subject of very few studies utilizing the advanced capabilities of satellites. This study aims to fill this gap by making use of the remarkable potential offered by the Ice, Cloud, and land Elevation Satellite-2 (ICESat-2), which is equipped with its Advanced Topographic Laser Altimeter System (ATLAS). With an observation footprint of approximately 17 meters, ICESat-2 introduces a new era in the precise measurement of water level variations in smaller water bodies. In this endeavor, we utilize ICESat-2 ATL13 products to undertake a comprehensive assessment of water level changes within Sri Lankan reservoirs, specifically focusing on those of smaller dimensions that have been largely uncharted in past research. One crucial facet of our research involves rigorous validation procedures to ensure the accuracy of water elevation measurements. By meticulously comparing ICESat-2 data with ground-based measurements collected from the Kothmale Reservoir, our preliminary findings underscore an encouraging level of accuracy. The root mean-square error (RMSE) and correlation coefficient (R), which is a measure of how close our measurements are to reality, consistently falls within an acceptable range (RMSE=0.35 and R=0.99), highlighting the transformative potential of ICESat-2 in assessing water level dynamics in smaller reservoirs.

Keywords: Reservoir Water Level; Water surface; ICEsat-2; Kothmale; Remote sensing

APPLICABILITY OF STATISTICAL DOWNSCALING MODEL (SDSM) TO DOWNSCALE RAINFALL OVER LOWER KELANI RIVER BASIN

D.M. Namudara^{1*}, H.S. Madushanka¹, M.M.G.T De Silva¹

¹Faculty of Engineering, University of Peradeniya, Peradeniya *Correspondence E-mail: e17217@eng.pdn.ac.lk, TP: +94770240408

Abstract: Downscaling refers to the process of refining and providing more detailed information about climate-related phenomena at a local or regional scale based on coarser global climate model outputs. Statistical downscaling is one branch of downscaling which involves establishing a statistical relationship between largescale atmospheric variables and local-scale meteorological parameters, such as precipitation and temperature. Statistical Downscaling Model (SDSM) is a combination of linear regression method and a stochastic weather generator. This study aims to examine the applicability of SDSM to downscale rainfall over lower Kelani River basin. The Kelani River is an important river that is prone to frequent flooding during monsoon seasons while flowing through the capital city of the country. The analysis was carried out by considering the Thiessen polygon average of rainfall of Colombo, Labugama and Hanwella rain gauge stations' data as observation network over the lower Kelani River basin. Appropriate predictor variables were selected from the downloaded data from the National Center for Environmental Prediction (NCEP) through an approach based on partial correlations. The calibration and validation of the model were carried out separately from 2001 to 2015 and 1986 to 2000 respectively. The model performance was assessed using different statistical metrics, including Model Mean Error (MME), Root Mean Square Error (RMSE), Nush-Sutcliffe Efficiency (NSE) and Coefficient of Correlation (R). The outcome of this study showed that the downscaled monthly average rainfall over the lower Kelani River basin has a strong correlation (MME is below 20%, RMSE=0.937, NSE=0.924 and R=0.963) with the observed data, while it poorly captures the extremes. Hence, these results can be applied to identify variations in future rainfall and to develop sound water management strategies.

Keywords: Statistical Downscaling; SDSM; Precipitation; Kelani River

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