

**The Chartered
Institute of Logistics
and Transport**



**Research
Symposium
on Supply
Chain and
Logistics**

Supply Chain and Logistics in the Digital Age

17th of February 2023

RESEARCH SYMPOSIUM ON SUPPLY CHAIN & LOGISTICS

Supply Chain & Logistics in the Digital Age 2023

The
Chartered Institute of Logistics and
Transport Sri Lanka

February, 2023

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Message of the President of CILT Sri Lanka

I am honored and privileged to pen this message in the first research symposium organized by the Chartered Institute of Logistics and Transport (CILT SL), as the president held on the theme of Supply Chain and Logistics in the Digital Age. This would be a great platform for students who are reading their degrees in logistics, transport, supply chain, and other related areas to publish their research findings to the industry. CILTSL education pillar has taken many initiatives in the past to enhance the capacity of young researchers and professionals in the field. This is yet another event that provides researchers the platform to publish their research findings.

I was delighted to see the number of abstracts received from students and industry indicating researchers' motivation and enthusiasm to take part in this event which provides a great platform to deliver and gather knowledge in a multidisciplinary research environment. Continuous engagement in research will help researchers to sharpen their proficiency and potential.

My gratitude goes to the: two keynote speakers Dr. Shamika N. Sirimanne, Director – of Technology and Logistics, UNCTAD, and Dr. Eoin Plant, Associate Professor in Logistics and Supply Chain Management, Edinburgh Napier University for accepting our invitation. and the sponsorship was given by SAGT to organize this event on a grand scale. Organizing a gigantic task of this nature would be next to impossible without proper leadership and teamwork. I would like to express my sincere thanks to the head of the education subcommittee Dr. H. R. Pasindu, the General Chair of the Research Symposium, Prof. Renuka Herath, the organizing committee members, Dr. Mahinda Bandara Yapa from Edinburgh Napier University, CILT SL education coordinator Charuni Premasinghe, and the other secretariat members for their immense commitment and support to materialize today's flourishing pinnacle.

I would like to wish all the success to all authors of this symposium and be expecting you to produce more advanced research in the future for the betterment of the Logistics and Transport fields.

Dr. Namali Sirisoma

The President,
CILT Sri Lanka



Message of the Vice President (Education) of CILT Sri Lanka

On behalf of the Program Committee, it is with great pleasure that I welcome you to the technical program of Symposium on Supply Chain and Logistics organized by the Chartered Institute of Logistics and Transport under the theme 'Supply Chain and Logistics in the Digital Age' held on the 17th February 2023.

The main objective of the symposium was to give a platform for the academia and the industry to share their research findings, industry best practices that would facilitate discussion on the key issues in the supply chain and logistics sector and identify solutions. CILT Sri Lanka plans to continue this symposium annually as a key event in the CILT Sri Lanka annual program.

We have had very positive responses for this inaugural event with over 50 abstract submissions received from the industry and the academia out of which 20 were selected for presentation at the symposium. We especially appreciate the support shown by our education partners by encouraging the students to submit abstracts to the symposium.

We are delighted to note the distinguished professionals, Dr. Eoin Plant, Associate Professor in Logistics and Supply Chain Management, Edinburgh Napier University and Dr. Shamika N. Sirimanne, Director - Technology and Logistics, UNCTAD who will be delivering their keynote address at the symposium. We wish to extend our gratitude to them for accepting our invitation to deliver the keynote address at the symposium.

Hope the participants will find the technical sessions and keynotes at CILT Symposium on Supply Chain and Logistics Management 2022 are insightful, simulate discussion with peers and inculcate innovative ideas to further expand the body of knowledge in their respective fields.

Dr. H. R. Pasindu

Vice President (Education)

CILT Sri Lanka

Programme Chair

The Research Symposium 2023, CILT Sri Lanka



Message of the General Chair of the Research Symposium

As the Chartered Institute Logistics and Transport (CILT) Sri Lanka, is proudly marking another remarkable milestone in its history of research and publications by organizing its Research Symposium on Supply Chain and Logistics for the second time. We received the abstracts from many leading public and private universities that offer degrees specialized in the broader spectrum of Supply Chain Management. The primary purpose of holding this symposium is also to pave a path for budding researchers in Sri Lanka to present their research findings in relation to their studies from transport, logistics and supply chain.

As the Chair the second research symposium of CILT Sri Lanka, it gives me immense pleasure to write this message by foreseeing its success already. The innovative theme of "Supply Chain and Logistics in the Digital Age" acknowledges the dynamic nature of the discipline and the role it plays in the digital age in creating value for the final customers. Modern supply chains are digitalized to make them more robust and resilience through their hardy network with strong integration and better collaboration as the foundation in creating value in a supply network more than creating value in individual organizations.

The successful blend of abstracts from different vectors in the broader scope of Supply Chain Management we have received, will undoubtedly create a scholarly platform to share the novel and unique knowledge. I further believe that this symposium will actively contribute by being able to do the least it can do through addressing various types of research gaps about which the CILT Sri Lanka can be proud of. I therefore make this an opportunity to congratulate organizing teams and the participants who present their valuable research findings in this valuable platform.

Prof. Renuka Herath

General Chair,
The Research Symposium 2023,
CILT Sri Lanka

Keynote Addresses



**Towards a Decarbonisation Roadmap
for Road Transport Companies**

Dr. Eoin Plant

Associate Professor in Logistics and Supply Chain Management,
Head of Research Degrees, and Programme lead for MSc Global
Logistics and Supply Chain Analytics at Edinburgh Napier University

Governing Council Member of CILT Ireland
Chair of CILT Ireland's Policy Committee



**Digitalisation and Logistics
in Supply Chains**

Dr. Shamika N. Sirimanne

Director - Technology and Logistics, United
Nations Conference on Trade and
Development (UNCTAD)

Organizing Committee

General Chair

Prof. Renuka Herath

Programme Chairs

Dr. H.R. Pasindu

Dr. Varuna Adikariwattage

Publication Chairs

Dr. Ishani Dias

Dr. Sabeen Sharic

Financial Chair

Mr. Shaja Musthaffa

Members

Dr. Priyangani Jayasundara

Mr. Naleen De Alwis

Ms. Inoka Gunaratne

Administrative Support

Ms. Enoka Weerasooriya

Ms. Charuni Premasinghe

Session 01:

**Maritime Transport - Port Performance,
Logistics Digitalization,
Labour Contribution**

Factors Affecting the Low Female Labor Force in Maritime Sector of Developing Countries in South Asian Region; In Reference to Port of Colombo - Sri Lanka

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The South Asian nations are significant actors in the world's maritime sector due to their extensive coasts, huge marine regions, and well-known international ports. Despite the sector's traditionally male-dominated work environment, nearly all South Asian nations are capable of advancing gender equality in relation to their respective field. The fact that accelerating number of obstacles is the challenging point of generating balanced gender participation within the sector. Aiming to support maintaining gender equality and to alter the obstacles, the objective of the study is to develop a systematic and complete agenda to identify the factors affecting the Low Female Labor Force in the Maritime Sector of Developing Countries in the South Asian Region in reference to the Port of Colombo. For the study, the considered factors affecting are demographic, occupational, health and safety, and social factors. The research is done under mixed method, using 132 female members of the maritime workforce from Port of Colombo Sri Lanka randomly selected and answered the structured questionnaire while semi-structured face-to-face interviews were conducted with 05 professionals from the same sector. Then the researcher used the deductive approach, which developed the hypothesis based on existing theory. And the research strategy was designed to test the hypothesis which supported the explanation of the relationship between the dependent and independent variables. In the findings of the study, both the demographic factors and the occupational factors depicted a positive relationship with the low female labor force in the maritime sector meanwhile both the health and safety factors and the social factors show a negative relationship with the low female labor force in the maritime sector in reference to the Port of Colombo. This study concludes, concerning more on the factors like age, gender, and higher education under demographic factors as well as occupational factors like work-life balance, salary, managerial positions, and organizational politics, as they will affect more to the female interference in the Maritime sector in the South Asian region in future. Gender parity might not be realized in this or the following decade, but in keeping with the advancements made by society as a whole, the maritime industry will continue to witness the growth of women working in the field.

Keywords : *Education, Maritime Sector, Female Labor Force, Gender Equality, South Asian*

Benchmarking the Performance of Port of Colombo compared to the Regional Container Ports

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The objective of the study is to evaluate the efficiency of port of Colombo as a container transshipment hub in the South Asian region compared to other major ports in the region. And further identification of the challenges and opportunities of the port of Colombo as a transshipment hub in the South Asian region. Port of Colombo has the potential to become one of the major transshipment hubs in the Indian sub- continent. And main feeder ports such as Port of Chennai, Port of Tuticorin and Port of Cochin..... are connected with the port of Colombo. Furthermore, hub ports such as Port of Singapore, Port of Salala.... are competing with the port of Colombo for the market share. Therefore, the aim of this study is to analyse the performance of these ports and evaluate whether these ports are performing up to their optimal levels in the container market in terms of technical efficiency.

Namely Port of Singapore, Klang, Tanjung Pelepas, Salalah, JNPT, Chittagong, Cochin, Chennai, Vishakhapatnam, V. O. Chidambaranar and Colombo are the main container hub ports and feeder ports in the region. These were evaluated using infrastructure, superstructure, and annual throughput data to identify the relative efficiency compared to port of Colombo. Maximum Quay length, Maximum Draft, number of container Berths, number of Reefer points, number of Quay Cranes, number of Rubber Tyred Gantry Cranes and number of container of terminals are taken as the input variables while annual throughput is the only output variable considered for this analysis. Data Envelopment Analysis was used to measure the relative efficiency. Output oriented model is the selected model to measure the CCR (named after Charnes, Cooper, and Rhodes), BCC (named after Banker, Charnes, and Cooper), Scale efficiency and to evaluate CCR superefficiency ranking at the final stage. Relevant data (2008 – 2019) were collected through the official websites of the selected ports and the data science related websites such as UNCTAD. Most of the throughput data are available in the official websites and the rest of the data were collected from the annual reports over eight years of period. Efficiency ranking was calculated through the data science related programming software R, version 4.20. Acquired results were taken for the discussion of the impact of each input and output variable to the technical efficiency. The lack of competitiveness of the port of Colombo has highlighted as Colombo port could achieve only the 8th place in raking. All the container port in the Indian subcontinent cannot be included into the research due to the unavailability of the data. The results of the study can be used by the management to identify the facility improvement needs of the relevant ports.

Keywords : *Asia, Container, Data Envelopment Analysis, Port of Colombo, Technical Efficiency*

Digitalization of Logistics in Port and Maritime in Sri Lanka

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The process of integrating technology with logistics is known as logistics digitalization. Although it is often discussed, digitalization is not being used in the port and marine industries. While attempts are made to digitalize logistics in other areas, this is less widely acknowledged in the port industry. With the help of this study, I intend to explain how digitization in logistics may prove beneficial in ports and other maritime businesses as well as the challenges of implementing it. I have collected data for this research from studies related to my subject area that have been carried out throughout Asia. People are hesitant to start digitalization because they are afraid of failing and losing the money that they invested as well as due to the fact that research in this area is scant. They could make use of a variety of information technologies, including AI (autonomous ships and smart shipping), blockchain, INAPORTNET, SIMLALA, and decision support systems for optimizing shipping operations. Utilizing digital technology may help the flow of funds, information, and things more easily. Nevertheless, it has been shown that digital transformation provides several benefits that may help shipping operators allocate their resources wisely and prevent bottlenecks, so enhancing operational efficiency, working efficiency, and customer connections. Since Sri Lanka is known as a global trading hub, I think that by adopting this case study, Sri Lanka may start to digitally transform logistics in the port sector and give itself a competitive edge.

Keywords : *Digitalization, Digitalization of Logistics, Digital Transformation, Port and Maritime, Supply Chain.*

Session 02:

Freight Forwarding and Third Party Logistics Service Providing

A Study on the Dimensions of Customer Loyalty in the Business to Consumer Market of Freight Forwarding Firms in Sri Lanka

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The freight forwarding sector is a substantial support arm for the export industry in Sri Lanka, which is rapidly expanding nowadays. This is a service-oriented sector where customer loyalty is considered as a crucial factor. Where in reality, building customer loyalty is critical to every organization's market survival, whereas client's dissatisfaction may lead to corporate losses and inefficient market competition. So that the prevailing need for analysing consumer loyalty attributes in the Business-to-Consumer (B2C) Market for the freight forwarding industry in Sri Lanka is investigated through this study. The purpose of this study is to analyse and assess the characteristics of consumer loyalty in the B2C Market. The researcher suggested four dimensions with respect to customer loyalty: service quality, customer satisfaction, relationship quality, and perceived value. The key purpose of this study was to investigate the consumer's demographic performance in the B2C sector of the freight forwarding sector. Accordingly, the researcher intended to evaluate the link among each dimension with respect to customer loyalty. The study utilized a positivist research method with a deductive approach, where method of survey was a quantitative type in questionnaire format. In order to identify elements of consumer loyalty, a conceptual framework was developed utilizing secondary data. Accordingly, dependent and independent variables were determined. To fulfil the study's aims, the researcher discovered and analysed the relationships of sample characteristics and performed an analysis on Pearson's correlation from the data obtained from members in the Export Association of Sri Lanka (EASL). A sample size of 60 was selected from 5 selected organizations using randomized sampling method. This sample included respondents from diverse areas involved in the freight industry. As per the study's findings, there was a substantial positive association between each factor towards consumer loyalty. Customer satisfaction had the strongest positive correlation, followed by service quality, relationship satisfaction, and value perception. It is proposed that trade analysts to be more concerned with the influences of these dimensions in the future considering on the benefit in the maintenance of a strong client base and lengthy consumer relationships in this sector. This study intends to apply the study's results to increase job efficiency and contribute to the expansion of freight forwarding enterprises in Sri Lanka's consumer market. Although this study focuses primarily on the export business, further research on the import industry or both sectors together could be carried out to analyse and evaluate customer loyalty throughout the B2C market of Sri Lanka's transportation management industry.

Keywords : *B2C Market; Freight Forwarding Industry; Customer Satisfaction; Service Quality; Dimensions of Customer Loyalty*

Revolutionalizing Sri Lanka's import container clearance process through the introduction of self service online eDA facility

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1. INTRODUCTION

The new normal brought about by the COVID-19 pandemic resulted in the second global crisis since 2008/09. The challenges of the pandemic threatened economies, stability of global financial institutions, crippled traditional brick-and-mortar operations and even widely adopted logistics and operational concepts such as just-in-time (Notteboom et al, 2021).

The shipping and logistics industries globally too faced the brunt of the pandemic. Shutting down of ports around the world due to lack of workforce, shock in supply chain causing blank sailings and port congestion caused by the reluctance and inability of consignees to collect cargo posed challenges to the usual operating model of the industry (Notteboom et al, 2021).

The Sri Lankan maritime industry was no exception to the challenges of COVID-19. Government imposed countrywide lockdowns forced citizens to social distance and take refuge from the virus. Many citizens faced economic challenges that focused their spend only towards essential items (Fowsar et al, 2022). The growth of manufacturing organisations contracted resulting from a decline in global demand, shipment delays and cargo capacity issues that impacted their supply chain (Malsinghe et al, 2022).

Sri Lanka's Port sector is considered an essential service provider and was mandated by authorities to continue operations during the countrywide lockdowns due to the pandemic. Ports were resilient and deployed business continuity plans that assisted with mobility of workforce, work from home policies, social distancing, and personal protective gear protocols etc allowing for continued smooth operations. The digital transformation globally within the industry (Balci, 2021), supported and accelerated the industry to aspirations to continue operations despite the pandemic conditions.

Despite the digitalization efforts to improve operations, the Port sector was impacted by long dwell times of import containers due to the immobility of consignees to take delivery of their cargo. The pressure on terminals performance because of yard congestion, drove terminals to reevaluate a decade long paper-based import container clearance process. The traditional process required Customer House Agents (CHAs) to visit a terminal Customer Service Center (CSC) to process physical documents and obtain a delivery pass authorizing them to take delivery of the physical container from the terminal grounds. The process encouraged physical interaction at a time when social distancing was strictly enforced.

In a bid to offer enhanced adherence to social distancing protocols at the time whilst enabling the timely clearance of import containers, South Asia Gateway Terminals (SAGT) explored

avenues to digitalizing the decade long paper-based import container clearance process. To expedite the process to meet the need of the hour, a simple email-based process was introduced, allowing for CHAs the ability to submit their documents for processing via digital means at the comfort of their homes and offices. The process immediately assisted SAGT to reduce footfall (traffic) at CSC and was well received by the CHA and import community.

Following on from its success, Team SAGT further enhanced the process by introducing a secure password protected online payment facility which allowed CHAs and importers to make payments due to the terminal via the secure e-Port platform from any bank and any location. The automation of the payment facility allowed for automated reconciliation of payment and improved processing time of documentation.

SAGT revolutionized the import container clearance process with the introduction of the 24/7/365 self-service e Delivery Advice (e-DA) print facility via the secure e-Port platform. Importers and CHAs are offered the convenience of logging into the platform at anytime from anywhere and obtaining an e-DA for the clearance of import containers, subject to digital approval from stakeholders such as customs and Sri Lanka Ports Authority confirming clearance from their respective areas.

2. MATERIALS AND METHODS

At the outset of the pandemic, a group from Team SAGT was appointed to study and facilitate timely delivery of import containers whilst ensuring safe working conditions for all stakeholders. A qualitative approach (Williams, 2007), with primary data collection (Hox and Boeije, 2005) was adopted to carry out research and implement a suitable solution. The project was initiated with discussions with industry stakeholders and associations ((Hox and Boeije, 2005), such as the Association of Clearing & Forwarding Agents (ACFA) to understand the challenges at hand impeding the timely delivery of import containers.

Following on from the initial discussions, the group then carried out a motion study (Williams, 2007) at the CSC to understand the type of documents, information that was processed as well as the processing timeline. A motion study assisted in designing a process map based on the objective and goals agreed with management and outlining the key inputs and outputs of the process (Biazzo, 2002). The process map assisted the team to identify potential risks of digitizing elements of the process and to prioritize documents and information to understand the “need” for physical submission of the set of documents for the delivery advice (Biazzo, 2002).

Following the review and extensive mapping of the process, the team segregated the process into primary steps and any steps that could be digitized simultaneously with the primary steps were categorized as secondary steps. Having identified a potential solution, the team engaged a focus group of customers to test each stage of the digitization process. Feedback from the focus group was adopted on an ongoing basis to improve the process and enhance the user experience on the platform (Hox and Boeije, 2005).

The digitized solution was launched to the market in stages to allow for the industry to adopt the new process and to assist with changing behaviour. Both digital and print mediums were adopted to onboard customers and drive awareness of the new solution (Karambelkar, 2019). Feedback was gathered from customers and used to further improve the process as well as the communication and onboarding.

3. RESULTS AND DISCUSSION

Due to the “need” of the hour to maintain social distancing, SAGT introduced a simple email-based process for CHAs to submit their documents for processing of e-DA through digital

means and limit their interactions which allowed for safer working conditions for stakeholders.

The motion study and input received during the interviews and engagement with industry stakeholders led to the automation of the reconciliation process of payments due to SAGT, via a secure password protected platform. The system allowed for CHAs to login to the e-Port platform and select containers registered under them in accordance with the Master Delivery Order (DO). Once the containers for clearance have been selected then the CHA could select additional services such as container weighing and make necessary payments from a bank of preference incorporating a unique invoice number. Once the payment has been received by the bank the unique invoice number is matched with the respective invoice and an invoice is generated via the system itself. CHAs have the option of downloading the invoice for printing or for use electronically as required which in turn also allowed to reduce the use of printouts where possible.

The online payment reconciliation was well received and resulted in approximately 50% of daily transactions being carried out on the system within the first two days of launch. Approximately 95% of daily transactions relating to import container clearance is now carried out via the payment process available on e-Port.

The success of the e-Port system led the team to further exploring opportunities to fully automate the import clearance process. The team engaged with stakeholder such as Shipping Lines, Sri Lanka Customs and Sri Lanka Ports Authority to obtain necessary approvals for import container clearance via digital means. The approvals were then matched automatically against the respective containers releasing any holds on the system and allowing a CHA to print or download the respective delivery advice from anywhere at any time.

The convenience of access to the system 24/7/365, allows for customers to guarantee import clearance from the terminal within the anticipated timelines and date subject to approvals being received by other relevant stakeholders. The system supports manufacturing customers with the timely importation of raw materials which in turn assist them with meeting their timelines for exports.

The digitization of the process initially challenged many who were set in their ways and reluctant to embrace change. However, team SAGT executed an extensive communication strategy involving video content, posters, training session, industry forums, industry associations etc in multiple languages to highlight the process of the digital e-DA process as well as the benefits to customers. Once customers were familiar with the system introduced, they in turn became the biggest advocates that drove behavioural change amongst the industry. Approximately 98% of import container clearances are completed by customers on the SAGT self-print e-DA facility available on e-Port.

4. CONCLUSION

In conclusion, SAGT was able to engage with Shipping Lines, Sri Lanka Customs, and Sri Lanka Ports Authority to introduce the most reformed import container clearance system to Sri Lanka. Team SAGT used a qualitative approach to collect the primary data and to build a suitable solution.

This electronic system made the import clearance process 10 times faster than the traditional process and this process could be considered sustainable due to the less paperwork needed. As this facility is available 24/7/365, anyone (CHAs) can log into the system at any given time and complete the requirements needed for clearance, which made it efficient and effective.

However, to keep on finding more revolutionized (digitalized) processes, it is required to have Information Technology specialists to develop more broad software, and user-friendly

platforms and to provide insights to new users on how to use such technology.

We recommend that future research will analyze how the terminals in Port Colombo could develop an integrated platform for both the export and import clearance process, preferably an e-customs platform integrating all the stakeholders in the industry.

5. ACKNOWLEDGMENT

We would like to express our gratitude towards The Chartered Institute of Logistics and Transport Sri Lanka for giving us an opportunity to submit our research findings to the **Research Symposium on Supply Chain and Logistics under the theme “Supply Chain and Logistics in the Digital Age”**.

Further, we would like to thank the main two pillars who guided us throughout this project, our Chief Executive Officer, Mr. Romesh David, and the Chief Commercial Officer Mr. Ted Muttiah. Also, all our colleagues who contributed in every possible way.

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Meta-Analysis on RFID Adaptation and Implementation in 3PL Providers

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Radio-Frequency Identification (RFID) enabled real-time information and data gathering in a sophisticated technological environment. RFID gives logistics managers a variety of tools for managing and tracking goods and assets throughout the supply chain. In the 3PL warehouse industry, persistent change management and ongoing customer-focused improvement processes are required to deal with the dynamic sector of warehouse logistics. To give a quantitative evaluation of the empirical literature and look at pertinent constructs, a meta-analytic approach is used. The focus of our data collection was to obtain correlations between constructs of interest from articles that describe research in RFID implementation in the 3PL industry. The sample of primary sources was gathered in two steps: conducted a manual review of four well-known logistics/supply chain management journals that focus on empirical research. Empirical studies of the 3PL industry were gathered and inspected for appropriate keywords to be used for the comprehensive keyword search. RFID has an impact on stock accuracy, avoiding out-of-stock situations at the point of sale, and avoiding backorders in addition to altering warehouse processes and staff expenses. Benefits, as well as ongoing investments for hardware, software service, and recurring costs, such as the cost of tagging and maintenance, need to be distributed among all members, such as the manufacturer, distributor, and retailer, taking into account these areas. RFID implementation in storage and warehousing systems typically leads to a significant improvement in product picking. Inventory accuracy is improved using RFID, rising from a typical 65 percent to over 95 percent. High inventory accuracy can also result in higher sales, but only if retailers use the information to streamline their procedures. The success of any RFID implementation depends on this crucial distinction.

Keywords : *3PL, Digital Age, Meta-Analysis, RFID Adaptation and Implementation, Supply Chain Management*

A Root Cause Analysis of the Factors Affecting the Container Liner Demurrage of an Import Company in Sri Lanka

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During the last few years, demurrage charges have significantly increased. Demurrage charges are an important tool for shipping lines to ensure the efficient use of their container stock. However, demurrage charges are crucial to the merchants for maintaining the required profitability for the sustainability of the business. This study provides an overview of the container liner demurrage of a company that imports high-tech laboratory equipment from various leading suppliers around the world and distributes those to organizations in the fields of education, research, and medicine in Sri Lanka. Currently, the company is being faced with paying huge amounts of demurrage charges for their shipments to container lines. Therefore, the main goal of this study is to explore the factors affecting liner demurrage and the best effective way to avoid demurrage charges. Fishbone diagrams have been used to analyse three main factors which cause demurrage to the company. Those factors are duty payment delays, the inefficiency of the third-party customs clearing agency, and paperwork errors of the company. In-depth interviews were conducted based on the demurrage summary of fifty containers of the company. The root causes for the main issues are low salary, poor training, noisy working environment, unnecessary processes and methods, and improper equipment facilities. Further, the study highlights the importance of having a stress-free environment, efficient employees, improved processes and methods, and providing proper equipment facilities.

Keywords : *Container Liner Demurrage, Detention, Fishbone Diagramme, Root Cause Analysis, Logistics Management*

Issues between the Third Party Logistics Service Providers and Customers in Sri Lanka

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Outsourcing logistics enables the supply chain participants in minimizing logistics costs by improving productivity and efficiency. The current global logistics industry has successfully widened its span to the level of 7PL. On the contrary, the Sri Lankan logistics industry struggles at the 3PL level. As a result, the local supply chain participants have a low possibility of improving their operational scope. While there can be a wide range of reasons that can impact the slow growth rates of the 3PL industry in Sri Lanka, it would be more apparent in focusing on issues between the 3PL customers and 3PL service providers in order to find the root causes. Therefore, this study focuses on the 3PL service providers and 3PL customers in Sri Lanka with the objectives of identifying the issues faced by the 3PL provider with their customers, the issues faced by the customers with their 3PL providers, and the common issues faced by both the 3PL provider and the customers when engaging in business operations. In order to recognize and better understand the prevailing problems in the 3PL market, the qualitative data obtained are evaluated using the thematic approach. The sample was selected from the 3PL providers and customers in the Western Province of Sri Lanka. The thematic analysis identified issues such as lack of cost awareness, unrealistic customer expectations, and the loss of customer feedback were the issues faced by the 3PL providers with their customers. Among the issues the customers face with their 3PL providers, benefits not being achieved in a timely manner, lack of global capabilities, loss of in-house capabilities and customer contact, and lack of good reporting skills were identified as few of the issues, while as common issues faced by both the 3PL provider and the customer were identified as lack of professionalism, skill gap, unwillingness to adapt to new technology and lack of communication were highlighted. The findings of this study will be useful to improve and enhance the logistics outsourcing market in Sri Lanka to compete with the global outsourcing market.

Keywords : *Third Party Logistics, Outsourcing, Supply Chain Management, Logistics Management, Third Party Service Provider*

**Session 03:
Outsourcing, Procurement
and Purchasing**

Factors Determining Adoption of Outsourcing Logistics Functions : A Study of Manufacturing and Trading Sectors in Sri Lanka

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This study aims at identifying the determinants of the adoption of outsourcing logistic functions in Manufacturing and Trading companies in Sri Lanka. After a careful review of the existing literature perceived cost effectiveness, quality concerns of logistics outsourcing, perceived risk, and perceived professionalism of logistics service providers were identified for the study as their high theoretical and empirical importance in determining outsourcing decisions. Primary data was collected by means of semi-structured questionnaires from 60 organizations that carry out manufacturing and trading businesses in Sri Lanka. The collected data were analyzed using descriptive statistics and simple and multiple linear regression analysis. Initial simple linear regression analysis proved the statistically significant impact that each of the identified variables has on the adoption of outsourcing. However, the multiple regression estimated in this study to analyze the collective effect of the suggested model concludes that the decision makers' perception of the cost-effectiveness of outsourcing and their perception of the risk of outsourcing better explain the adoption of outsourcing in the Manufacturing and trading sector in Sri Lanka. Hence, the outsourcing decision depends on the careful assessment of the decision-making company on its cost-effectiveness and possible risk. Therefore, the findings of the present study suggest that outsourcing partners should be carefully selected in order to get the benefit of outsourcing. The significance of this study is to benefit the manufacturing and trading companies to improve their operational performance and this can be used as a strategic tool for cost reduction, increase the efficiency & effectiveness of Logistics operations, and also productivity improvement of the companies by using good outsourcing practices and it will also help to compete with global market by improving efficiencies. Furthermore, this study can be helpful to the management of manufacturing and trading organizations in the world to take decisions on outsourcing functional departments and this can be a benchmark to these organizations whether outsourcing is beneficial to the organizations and whether it's feasible to outsource the logistics functions to the third-party service provider.

Keywords : *Outsourcing Logistics Functions, Multiple Regression, Descriptive Statistics, Adoption of Outsourcing, Logistics, Determinants of Outsourcing, Risk of Outsourcing*

Assessment of Supplier Acceptance of Electronic Reverse Auctioning Tools (E-RA) in Procurement, Using Technology Acceptance Model (TAM) – Case of Sri Lanka

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Electronic reverse auctioning tools are used in the industrial sourcing projects and activities as a strategic negotiating tool. Electronic Reverse Auctions are defined as internet based, real-time and dynamic auctions between organizations and suppliers, where potential suppliers compete against each other in terms of price under certain set of agreed terms and conditions.

However, in most of the developing countries, electronic reverse auctions are considered as controversial sourcing tools, as those are sometimes criticized on the potential impact it can create on buyer-supplier relationships.

This study aims to assess the level of acceptance of electronic reverse auctioning tools by suppliers, considering a case within a Sri Lankan diversified conglomerate. Empirical data with regard to user experience and perception on electronic reverse auctioning tools, has been collected from a sample of suppliers. Sample consisted with experienced suppliers on using reverse auctioning tools, from various industry sectors such as water consumables, oil and lubricants, chemicals, stationery, linen, wines and spirits, chicken, freezers and coolers, solar panels, air conditioners and computers.

Among the many models and frameworks introduced by scholars on testing user adoption of new technologies, the Technology Acceptance Model (TAM) has been selected to conduct this study. This model has been enhanced by researchers to increase accuracy and reliability, and the latest TAM consists of factors that can influence the User Acceptance (UA) of technology-based tools. According to TAM model, Perceived Usefulness (PU) and Perceived Ease of Use (PEU) of the tool can influence the Attitude of the User (AU) about the tool and ultimately influence the Behavioural Intention of the User (BIU) to determine whether to accept or reject the given tool. A questionnaire prepared by covering all attributes of TAM model was used to collect supplier responses. After the collection of empirical data (supplier responses), a descriptive analysis was conducted using correlation analysis and hypothesis testing on identified variables, after the verification of data on internal consistency and reliability. Results of the study reveal that the selected supplier base of the given Sri Lankan conglomerate, have a significantly higher degree of acceptance for reverse auctioning tools, after evaluating the user acceptance (UA) and behavioural intention to use (BIU), and its correlation with PU, PEOU. In addition, it is proven that PU, PEU, AU and BIU have not been influenced by external variables (age, gender, education level, IT knowledge, work experience and internet usage) related to supplier, considered for the study.

Keywords : *Reverse Auctioning, E-Procurement, Technology Acceptance Model*

Improving Pharmaceutical Drugs Availability in Hospitals during the Economic Crisis in Sri Lanka; Case Study Based on Hemas Hospitals

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The capability of improving pharmaceutical drug availability in a hospital plays a major role during an economic disruption. Inventory decision-makers struggle to manage the balance between demand increase and product scarcity. In a healthcare context, the demand massively changes based on the availability of various brands for a certain generic drug. The market volatility and dollar crisis in the Sri Lankan economy heavily influenced the existing healthcare-related imports. The scarcity of certain vital drugs was observed in island-wide private and government-sector hospitals. On the other hand, the criticality of pharmaceutical drugs requires a well-organized inventory management approach as it is directly connected with the lives of the patients. This case study discusses how the inventory was managed and improved medication availability in Hemas Hospitals. As the methodology, major categories were identified in pharmaceutical drugs which are used in the hospital. Quantities were defined for respective periods depending on the criticality of the drug and brand rationalization using past data. The judgmental forecasting mechanisms were used to determine the order quantities during the crisis period. The ordering efficacy was improved through visualization of availability, and the creation of forums to communicate with cross-functional teams within the hospital and with external parties such as major suppliers. According to the results of this study, product availability was improved in both hospitals of the company in vital, essential categories. The ordering procedure was changed from the previous method, and the efficiency rate improved with the often discussions and follow-ups that happened recurrently. The collaboration of cross-functional teams such as clinical, pharmacy, and supply chain teams were improved within the organization. The company was able to optimize the inpatient & outpatient requirements compared to the island-wide pharmaceutical drugs availability. In conclusion, the average surgery count has improved by 10% in Hemas hospital Wattala during the crisis period from April to October (2022/2023 FY). In Hemas hospital Thalawathugoda, the average surgery count has increased by 6% compared to the previous financial year. Scheduled surgeries were able to complete with the effective management of critical drug supply and it helped to ultimately save and improve more than 1000 lives. As a future research area, a scientific predictive model can be developed using the existing data infrastructure so that it can improve the efficiency of the decision-making process in the healthcare supply chain.

Keywords : *Availability, Economic Crisis, Healthcare, Inventory Management, Pharmaceutical Drugs*

The need for monitoring and evaluating the outcomes of joint sourcing group strategy: Evidence from a school feeding program in Sri Lanka

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International Non-Governmental Organizations (INGOs) whose motive is child safeguarding, are working with the Government of Sri Lanka and International donor organizations on school feeding programs. The objectives of these INGOs are to reduce child nutrition problems, increase daily attendance, increase proper food and health habits, and promote local food culture in order to create a better person for society. School feeding programs are highly dependent on the purchasing mechanism of food commodities. Joint sourcing groups (JSG) are a major purchasing strategy used by a few INGOs. JSGs are clusters of school meal providers (SMP) which are formed in order to allow for bulk purchasing of ingredients. By developing JSGs within a community, the targets are making stronger market linkage, making sustainable cost savings of ingredients, and reducing SMP turnover. It is vital to monitor and evaluate the strategies used in the project for its success. Several organizations have shown that sustainability, effectiveness, and efficiency are the evaluating factors of a program. Failure to do this will result in high costs of school meals, high turnover and lost capacity of SMPs, and even losing the donor organizations for the INGOs. Ultimately these will be obstacles to reducing child nutrition problems, increasing daily attendance, increasing proper food and health habits, and promoting local food culture. Therefore, monitoring and evaluating the outcomes of the JSG strategy is important to achieve the objectives of the project. The number of students fed by this project, food wastage, and cost benefits recommended indicators to evaluate Stronger market linkage, Sustainable cost-saving of ingredients, and reduced SMP turnover respectively. Therefore, this evaluation process would be beneficial to all the stakeholders who have been involved in this project such as INGOs, Donor organizations, Government organizations in terms of strategies and school children in terms of health and educational development.

Keywords : *Monitoring and Evaluation, Joint Sourcing Groups, Purchasing, Humanitarian, Outcome*

Information on Organic Food Expected by the Consumers for their Purchase Decisions

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The expanding global population has increased the urge to produce more food. This has finally led to the extensive use of chemicals to increase output and meet market demand. In this scenario, the demand for organic food has increased dramatically due to environmental and health implications. Consequently, consumers are increasingly seeking green elements in food and beverage products not only to fulfil their physical demands but also to satisfy their social needs and be more health-conscious. Organic food purchasing can be further expanded by accurately identifying what information consumers consider before purchasing organic food. This study was conducted to identify the information on organic food expected by the customers that may affect their purchase decisions of organic foods in Sri Lanka. Fifty customers were chosen using the convenience sampling method for the quantitative study and ten organic food consumers in the Colombo District were chosen for the qualitative study. An online survey was utilized for gathering quantitative data and interviews were conducted for collecting qualitative data. The thematic analysis was employed as the data analysis tool for the qualitative analysis, while the ordinal logistic regression method was used for the quantitative analysis. SPSS version 22 was used for the statistical analysis of the quantitative data and the qualitative data were analyzed using QDA Miner. According to the result of the qualitative analysis, the price, information on the manufactured area, product certification, and nutrition information demonstrate an impact on the purchase decision of organic food. According to the quantitative analysis, price, information about the manufactured area, and nutrition information have a significant impact on the purchase decision, while product certification does not have a significant impact on the purchase decision of organic food.

Keywords : *Organic Food, Purchase Decision, Information on Organic Food, Product Certification,*

Funding acknowledgment: This research was supported by the KDU Research Grant 2021 [KDU/RG/2021/FMSH/003].

Review of the Road Sector Investments in the Last Decade: Its Economic Impact and Sustainability

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The Sri Lankan government invests a substantial portion of its annual capital budget on road development projects. Since the end of the terror war in 2009, the Road Development Authority (RDA) has spent around 6% of the government's overall construction budget on road projects. Moreover, provincial councils get a significant amount of revenue, and roughly one-third of RDA funding is dedicated to road infrastructure improvement. When examining the economic sustainability of a particular road length, an EIRR (Economic Internal Rate of Return) of 10-12% is generally utilized. Given the country's GDP, this is a significant amount of money for a developing country like Sri Lanka. As a basis, knowing how effectively capital funds are delivered vs benefit utilization is crucial for a sustainable economy. Furthermore, the country's per capita expenditure on transportation administrative overheads is dramatically high, creating an unsustainable expenditure for the government of Sri Lanka with a fragmented road development setup. In contrast, this study examines whether these road investments have been efficiently utilized in the recent decade to contribute to the country's long-term economic growth.

The study's data was gathered from primary and secondary sources, with an emphasis on RDA, PRDA, and rural road initiatives. The methodological approach examined the performance of road sector investments during the past decade, with a focus on how funds were allocated for road network construction. The identification of how total investments were shared across several state agencies in Sri Lanka, as well as a multi-year benefit calculation in contrast with VOT (Value of Time), VOC (Saving on Vehicle Operating Cost), Accident Cost Saving, and Regional Benefits, was carried out. Funding patterns and scenarios were constructed, while investment distribution by province, road class, and geographic location were taken into account in order to compare the GDP growth rate of each province and, as a consequence, identify development opportunities in respective locations. The calculation was done considering the total expenditures where all these projects would have been feasible under a Minimum EIRR of 10-12%. The study looked at whether these initiatives will offer the expected benefits to the economy and if this is reflected in the natural GDP growth rate. The Harrod-Domar (HD) Model of Economic Growth and Development Theory's Macroeconomic approach was applied in this case.

Descriptive statistics and regression analysis were performed in the context of project EIRRs, financial investments, NPV, road length, and road class, and various associations were discovered. The findings indicated that expected benefits in the road sector during the preceding decade were exaggerated since the underlying premise of estimated economic benefits converting into economically productive activities and economic growth was not effectively comprehended. The study's findings are useful in determining which road investments with enough development potential give the maximum return. Similarly, for understanding how budget allocations may be made for the next 5-10 years to maximize return on investment, as well as diversifying road sector investments to maximize advantages for Sri Lanka. Furthermore, the results are useful in determining if there is a better balance between infrastructures and sectors that will contribute to the overall economic growth in a specific region.

Keywords : *Road Sector Investment, Benefit Utilization, Growth Potentials, Budget Materialization, Sustainable*

**Session 04: Green Supply
Chain and Reverse
Logistics**

A study on the Green Supply Chain Management (GSCM) practices and the strategies to overcome the challenges in the implementation of GSCM practices in the Apparel industry in Sri Lanka

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The paper aims to explore on the Green Supply Chain Management (GSCM) practices adopted and the strategies that could be formulated to overcome the challenges in the implementation of GSCM practices by the apparel sector companies in Sri Lanka. Confronted with the joint requirement of competitiveness and sustainable development, companies are forced to move towards green supply chain practices with the increase of global pollution and it has made the corporate players to introduce ecofriendly products to the market and seems the urgency for the textile commercial enterprises to adopt the same GSCM practices to the apparel industry in the digital age as well. Customers are more inclined towards environmental friendly products and to follow the green standards and techniques that have been the fundamental roots for any organization when achieving the competitive advantage. A quantitative survey method is used and through the self-administered questionnaires, the study collects the data from four main companies in the apparel manufacturing sector in the Western province. Descriptive statistics are used for the analysis. Results indicate that only few companies are focused on GSCM practices. Most of the companies have adopted the green production and the least adopted practice is the green delivery. The reasons for not applying the GSCM practices were found to be lack of skillful staff, high inventory costs, transportation issues etc. Hence the lacking areas need to be addressed in order to implement the GSCM practices effectively in the apparel industry in Sri Lanka. Further the paper focuses on the impact of GSCM practices such as reduction of wastage of water, solid wastage and polluted air emission and effective GSCM practices will lead to the increase of number of goods delivered on time, helps to promote the product quality, decrease the cost for energy and the production costs as well. A sound knowledge on green procurement, green designing, green manufacturing, green distribution, recycling techniques and reverse logistics should be integrated in the Sri Lankan Context in order to overcome the challenges. Hence the aim of this manuscript is to demarcate the GSCM practices related to Apparel Industry in Sri Lanka and to overcome the challenges of such implementation successfully. Therefore, It requires to bridge the gap by attempting to examine the effect of GSCM practices including green procurement, green designing, green manufacturing and green distribution in apparel industry.

Keywords : *Apparel Industry, Challenges, Digital Age, Green Supply Chain Management, Impact*

The significance of implementing a digital supply chain system in the context of Sri Lanka's apparel industry

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To significantly improve performance and customer satisfaction, install sensors everywhere, create networks everywhere, automate everything, and analyze everything. The application of the Internet of Things, cutting-edge robotics, and sophisticated big data analytics in supply chain management is known as supply chain 4.0. The turmoil of Industry 4.0 is forcing businesses to reconsider how they plan their supply networks. Newly emerging digital supply chain business models could be used by supply chains. The distribution of wealth to previously underserved areas and the continued global expansion of rural areas are examples of megatrends. For this study, I gathered data from individuals with connections to the apparel industry as well as research on my subject that has been done all over Asia. People are reluctant to begin digitalization due to a lack of research in this field, their fear of failing and losing their investment, as well as other factors. In addition, some people may find it difficult to learn the necessary digital skills needed for success in this field, making them reluctant to invest their time and resources in digitalization. Digital supply chain can help businesses become more competitive and efficient. The supply chain's digitalization enables businesses to manage the changing customer demands, supply-side difficulties, and unmet efficiency improvement expectations. A Supply Chain 4.0 is a result of digitization. One of the most significant industries in Sri Lanka may be the clothing sector. It has the potential to generate hundreds of millions of dollars in revenue for the nation. Additionally, the sector may contribute significantly to Sri Lanka's foreign exchange revenues. Sri Lanka's garment sector is now dealing with a number of issues, including a high cost of production, a skilled labor shortage, and a lack of innovation. Both the nation's economy and its competitiveness abroad are being impacted by these issues. Companies involved in the garment sector in Sri Lanka must implement digitalization of the entire supply chain in order to overcome these obstacles and grow the global market. Consequently, everything becomes organized.

Keywords : *Digitization, Industry 4.0, Supply Chain Management, Technological Change, Value Chain*

The need for evaluating the supply chain uncertainty reduction ways in Reverse Logistics

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During the last decade, attention on reverse logistics (RL) in supply chains has increased as RL yields more economic value and environmental concern. Most of the reverse logistics operations are suffering from supply chain uncertainties. The types of supply chain uncertainties in the RL have been well identified in the literature. There are many ways in practice adopted by the industry to reduce the supply chain uncertainty in RL. These ways are aimed at reducing the cost of supply chain uncertainty in RL. But a few scholarly works have been done to evaluate the impact of the supply chain uncertainty reduction ways on their level of reducing the cost of uncertainty in RL. Failure to evaluate the impact of supply chain uncertainty reduction ways on their level of cost reduction leads to many adverse impacts. One such adverse impact is the increased lead times. Increased lead times result increased cost to the customer. Increased cost to the customer satisfaction results lower customer satisfaction. Lower customer satisfaction results on lower revenue for the shipper and the third-party logistics operators. In addition, the supply chain reduction ways also incur cost. This cost becomes unrecovered and wasteful. At the end, unavailability of evaluation paves the way for cost for all the stakeholders in the RL process. Therefore, if a proper evaluation is in process, the levels of achievement of the adopted ways to reduce the supply chain uncertainty in the RL can be measured. This lead time must be measured in terms of monetary cost. This measurement can help modify /continue /alter the existing supply chain uncertainty ways in the RL to reduce lead times. Eventually, proper evaluation can reduce the total cost of supply chain uncertainty in RL.

Keywords : *Lead Time Cost, Evaluation, Reverse Logistics, Uncertainty*

Supply Chain Visibility in Leading Organizations

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In recent decades, due to globalization, technological development, increased product complexity, and heightened customer demands, competitiveness in the industry has increased. As a result, industries are trying to increase their productivity. By enhancing efficiency and minimizing errors, supply chain visibility guarantees that you are knowledgeable about every part of your inventory and enables you to better serve consumers. By putting in place the appropriate infrastructure, you can increase supply chain visibility, which will help you cut costs, boost performance, and spot issues— all of which will help your reputation and business expand. Supply chain visibility (SCV) has a vital role because it provides data to the required parties. The use of information systems in SCV helps the consumer to ensure product safety and make sure products are delivered on time which is a main concern in the maritime and airline industries. The purpose of the research is to identify how an industry tracks individual components and final products moving from manufacturer to consumer and the technology and information systems used to improve efficiency. Additionally, this research will analyze the current approaches and strategies used to improve supply chain visibility and will identify areas where improvement is necessary. This study reveals that the characteristics of SCV can be captured in terms of the accessibility, quality, and usefulness of information, the benefits that could be gained through SCV, the impacts of digitalization and big data in SCV, Technology and software systems that could be used in SCV, This study will help to understand the current and future trends in supply chain visibility and risk factors that limit the efficiency of SCV. This research has used explanatory research as a research approach in this study, The Supply Chain Visibility in Leading Organizations' research methodology utilizes a qualitative technique to understand the level of visibility that organizations have in their supply chains. Qualitative techniques such as interviews given by logisticians and article surveys. In this study, the research tries to analyze the importance of visibility and the challenges faced by supply chain companies, especially logistics or 3pl industries. However, why companies are unsuccessful in attempting to give SC visibility and their drawbacks in this sector? Still, many questions remain unanswered about how to achieve operational capability and Visibility in Sustainable Supply Chains. Furthermore, organizations need to make sure that their visibility strategies are tailored to their business needs and resources. This research has also demonstrated that leading organizations are increasingly investing in technology and other solutions to achieve greater visibility and efficiency in their supply chain

Keywords : *Supply Chain Visibility, Bigdata, Digitalization, Technology, Software System*

Employee Relations and Employee Engagement: A Study Based on a Logistics Company in Katunayake, Sri Lanka

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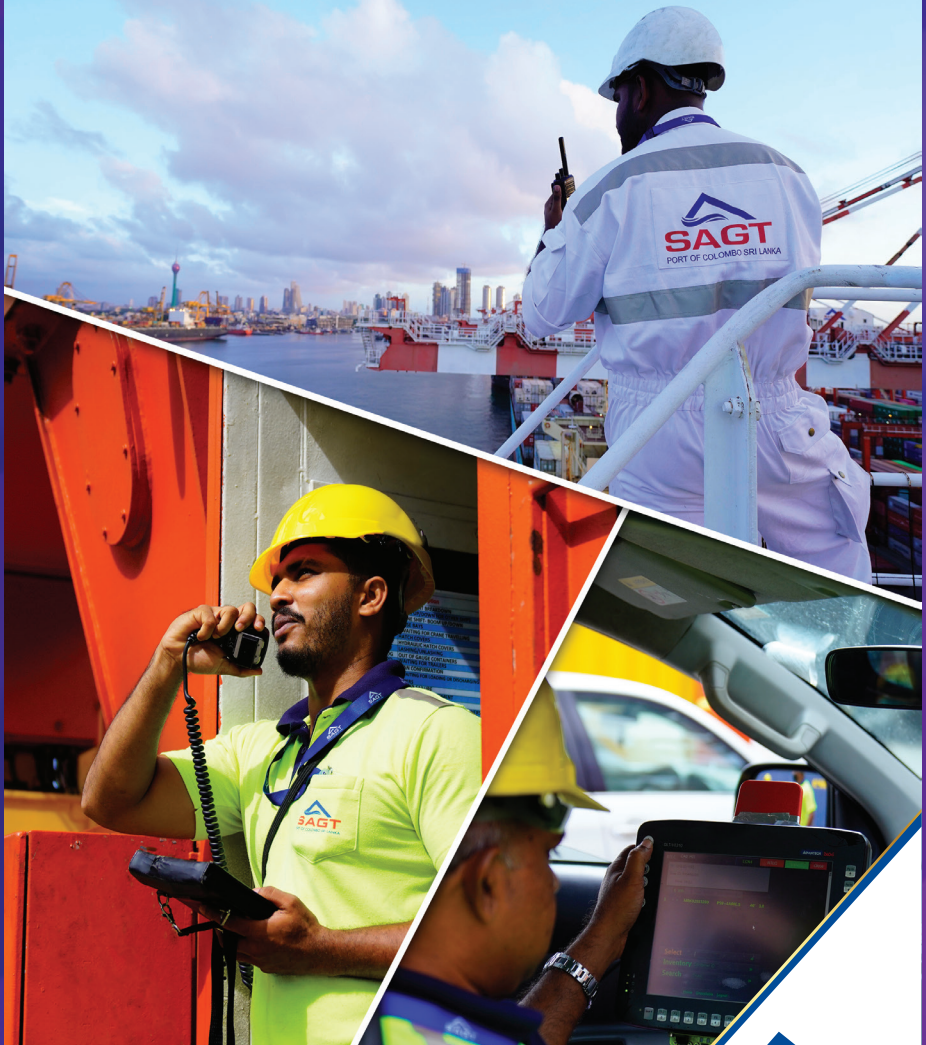
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Healthy employee relations enable the organization to achieve its goals effectively and efficiently in the given time frame. A committed workforce significantly contributes to the sustainability of the organization. The selected company for the study has ten years of history and is located in the BOI zone in Katunayake, Sri Lanka. The company operates 24 hours on daily basis under two shifts and has around 1000 multinational employees in Sri Lanka and India. It was observed that employee turnover has increased significantly and those who join the company recently tend to stay for a shorter period. Also, there is high absenteeism and less engagement, particularly in the category of production staff. Therefore, this study explains the impact of employee relations on employee engagement. Communication, organization policies and procedures, employee recognition, and working conditions have been taken as the variables to indicate employee relations at the selected logistics company. One hundred and seventy employees were taken randomly as the sample of the study from a population of 287. A multiple linear regression model was utilized to model the variables of the study. Further, the Cronbach Alpha test was utilized to test the reliability of the constructs. The study highlighted the key areas which need to be improved further to enhance employee engagement in the selected logistics company.

Keywords : *Employee Engagement, Communication, Employee Recognition, Policies & Procedures, Working Conditions, Employee Relations*

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