



IEOM Society International

**The 5th North American International Conference on
Industrial Engineering and Operations Management**
Detroit, Michigan, USA, August 10-14, 2020

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Does driver-passenger conversation affect safety on the road?

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Abstract

Distraction to driving activity can arise from inside or outside the vehicle. Passenger presence is believed to be one of the in-vehicle distractions. However, the existence of a passenger also crucial for drivers to minimize the monotony ambience. In this study, the conversation between the passenger and driver will be the focus of discussion in determining the distraction phenomenon. This study

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Keynote

Keynote Speakers – 2020 IEOM Detroit Conference

Conference Co-Chair Remarks: Monday, August 10, 2020, 9:30 – 9:40 am

Dr. Leslie Monplaisir, Chair and Professor, Industrial and Systems Engineering Department, Wayne State University

Opening Keynote I: Monday, August 10, 2020, 9:40 – 10:20 am

Dr. Donna Bell

Global Director

Technology and Features Strategy and Planning

Ford Motor Company

Dearborn, Michigan



Dr. Donna Bell is Global Director, Technology and Features Strategy and Planning at Ford Motor Company, a \$150B company. Collaborating with key stakeholders, Donna establishes and communicates customer driven strategies that increase corporate growth in areas such as connectivity, artificial intelligence (AI), driver assist technology (DAT), and robotics.

Previously, Donna served as the CTO Chief of Staff at Ford, where she improved research processes, managed strategic university alliances, and enhanced Ford's STEM strategy. She led strategic partnerships and external relationships, including Ford's involvement in US CAR (U.S. Council for Automotive Research).

Donna also served as research operations director at Ford's Palo Alto Innovation Labs. Her transformational leadership was important in building the new facility, acquiring the highest caliber talent, managing a multi-million dollar

operating budget, creating a culture of innovation, and connecting new technologies and innovations that were created in Silicon Valley to Ford's winning portfolio. Trained in design thinking, Donna was instrumental in promoting and delivering transformational technologies including AI, Machine Learning, Autonomous Driving Technology including LiDAR, in-vehicle infotainment (IVI), and Connectivity.

From 2014 to 2017, Donna served as the electrical Global Product Development (PD) Quality manager at Ford. She collaborated with product development to ensure designs delivered revenue generating customer experiences. Through Donna's continuous

improvement experience and using proven quality tools such as failure mode avoidance, quality function deployment, and customer driven quality design electrical quality improved by more than 35%. Bell's inspirational leadership led to the electrical organization achieving best in class quality for Lincoln vehicles multiple times, and Ford being recognized by the 2017 JD Power Initial Quality Study for overall quality improvement.

Donna's proven delivery and technical excellence led to her receiving multiple patents and delivering many revenue generating 1st to Ford technologies including the award-winning Sync infotainment system, the fuel saving stop-start technology, and the first-to-industry MyEnergi Lifestyle project, in conjunction with Georgia Tech, projected a 60% energy cost savings and CO2 improvements of over 8,000 kg by incorporating key energy efficient solutions into an average U.S. home.

Donna's involvement in the community is extensive and involves creating programs that educate and develop students in science, technology, engineering, and mathematics (STEM). She has held multiple leadership positions in professional organizations including National Society of Black Engineers, Society of Women Engineers, and Ford's first employee resource group, FAAN (Ford African Ancestry Network).

Donna holds a Bachelor of Science degree in Electrical Engineering from Lawrence Technological University (Southfield, MI), Master of Science degrees in Electronics and Computer Control Systems and Engineering Management, and a PhD in Industrial and Systems Engineering all from Wayne State University (Detroit, MI).

Opening Keynote II: Monday, August 10, 2020, 10:20 – 11:00 am

Dr. Jiju Antony



Professor of Quality Management
School of Social Sciences, Edinburgh Business School
Operations and Logistics Group
Heriot-Watt University
Edinburgh, Scotland, UK

Editor of International Journal of Lean Six Sigma
 Associate Editor of TQM and Business Excellence (Taylor and Francis)
 Associate Editor of TQM Journal (Emerald)
 Associate Editor of Quality in Education (ASQ)

Professor Jiju Antony is recognised worldwide as a leader in Lean Six Sigma (LSS) methodology for achieving and sustaining process excellence. He is a Professor of Quality Management and certified LSS Master Black Belt in the Edinburgh Business School at Heriot-Watt University, Edinburgh, Scotland. He has a proven track record for conducting internationally leading research in the field of Quality Management and Lean Six Sigma. Professor Antony has authored over 400 journal, conference and white papers and 10 text books. He has published **over 250 papers** on Six Sigma and Lean Six Sigma topics and is considered to be one of the highest in the world for the number of Six Sigma publications. Two of his papers published in 2002 entitled (**Critical**

Success Factors for the successful implementation of Six Sigma projects in organisations (over 900 google citations) and Key Ingredients for the effective implementation of Six Sigma program (over 900 google citations)) have the highest citations making them the most referred to papers in the world in the field of Six Sigma and Continuous Improvement. **He has an h-index of 79** according to Google Scholar **with a total of over 14000 citations on Six Sigma and Lean Sigma topics alone**. He is currently serving as the Editor of the International Journal of Lean Six Sigma, Associate Editor of the TQM and Business Excellence Journal, Associate Editor of TQM Journal (Emerald) and Associate Editor of Quality in Education (ASQ). He is serving on the Editorial Board of six international journals. Professor Antony has worked on a number of consultancy projects with several blue chip companies such as Rolls-Royce, Bosch, Siemens, Parker Pen, Siemens, Johnson and Johnson, GE Plastics, Ford, Scottish Power, Tata Motors, Thales, Nokia, Philips, General Electric, NHS, Glasgow City Council, ACCESS, Scottish Water, Police Scotland,

University Sectors and a number of Small and Medium Sized Enterprises. Professor Antony is a Fellow of the Royal Statistical Society, UK; Fellow of the Chartered Quality Institute, UK; Fellow of the Institute of Operations Management, UK; Fellow of the American Society for Quality and Fellow of the Institute of Six Sigma Professionals. He has been elected to the International Academy of Quality as an Academician this year.

Program Industry Co-Chair Remarks: Tuesday, August 11, 2020, 9:30 – 9:40 am

Dr. Saso Krstovski, MBB, Lean Manufacturing Coach /Six Sigma Master Black Belt, Van Dyke Transmission Plant, Ford Motor Company, Michigan, USA

Tuesday Keynote I: August 11, 2020, 9:40 – 10:20 am

Dr. Raj Kawlra



**Director, Global Manufacturing
Methods and Measurements
Fiat Chrysler Automobiles (FCA)
Auburn Hills, Michigan**

Dr. Raj Kawlra is Director of Global Manufacturing Methods and Measurement at Fiat Chrysler Automobiles. He has 35 years of automotive experience in concurrent engineering, advanced manufacturing engineering, quality, lean manufacturing, launching products, and manufacturing planning functions. He has had the opportunity to work in both powertrain and vehicle assembly. Over the years, he has successfully developed and implemented major strategies to drive improvements in throughput, quality, and cost.

Dr. Kawlra spent the first 16 years of his automotive career at GM Tech Center with responsibilities ranging from lead process engineer for the first “lights out” Flexible Manufacturing System in Powertrain in the late 80s to leading the development of a simple plant floor problem solving toolkit that leveraged advanced statistics and enabled GM to achieve world-class dimensional quality

levels during the MY97 launch of their full size trucks at (3) plants. He also had the opportunity to work with the best lean gurus to develop GM’s Global Manufacturing System and implement it for their greenfield plant that launched Cadillac CTS in CY01.

Dr. Kawlra joined Chrysler in CY01 with the responsibility to develop and implement the Black Belt program at all of their (28) plant locations. Over the years, he has held numerous leadership positions ranging from Manufacturing Quality Director to Dimensional Quality Director to Industrial Engineering Director to the Manufacturing Planning Director. Over the last 5 years, he has also led the development and implementation of World Class Technology (WCT) – application of lean principles to manufacturing engineering function that designs and implements equipment and processes for all launches – first of its kind in the industry. WCT has been successfully applied across all regions and divisions at FCA, with savings ranging from \$5 to 10M for each launch. In his current role as Director of Global Manufacturing, his responsibilities include leading global benchmarking activities, setting competitive targets and driving improvements in operational business metrics, long-term manpower planning, and global data analytics strategy.

Dr. Kawlra is a Big 10 fan, having received degrees from University of Wisconsin (MS, Mech Engr), University of Illinois (MS, IE), and University of Michigan (PhD, IOE). He has a BS in Mechanical Engineering from Indian Institute of Technology. He also has an Executive Management Certification from INSEAD. Over the years he has been on the Department of Defense Oversight Committee (CY09- 11) and has served on the Advisory Board of University of Wisconsin’s Industrial and Systems Engineering department

(CY11-17). Dr. Kawlra served as Industrial Advisor of two doctoral students of Doctor of Engineering in Manufacturing Systems at Lawrence Technological University.

Tuesday Keynote II: August 11, 2020, 10:20 – 11:00 am

Dr. Seth Guikema



Professor

Department of Industrial and Operations Engineering and

Department of Civil and Environmental Engineering

University of Michigan

Ann Arbor, Michigan, USA

President, Society of Risk Analysis

Dr. Seth Guikema is a Professor in the Department of Industrial and Operations Engineering and the Department of Civil and Environmental Engineering at the University of Michigan as of August 2015. Prior to this, he was an Associate Professor in the Department of Geography and Environmental Engineering (DoGEE) at Johns Hopkins University. He is also an adjunct Professor II in the Department of Safety, Economics, and Planning at the University of Stavanger in Norway, and a Data Science Research Fellow at One Concern, Inc., a Silicon Valley start-up.

His academic training includes a B.S. in Civil & Environmental Engineering (Cornell University), a M.S. in Civil & Environmental Engineering (Stanford University), a M.E. by thesis in Civil Engineering (University of Canterbury in New Zealand), a Ph.D. in Management Science & Engineering with a concentration in Engineering Risk & Decision Analysis (Stanford University), and a postdoctoral research position in Civil & Environmental Engineering (Cornell University). He began his faculty career at Texas A&M University in Civil Engineering and moved to DoGEE at JHU in 2008. He received tenure at JHU in 2014 and became the Carol Linde Croft Faculty Scholar there in 2015. He moved to the University of Michigan in August 2015. Seth is currently the Area Editor for Mathematical Modeling in the journal Risk Analysis, was an Associate Editor for the ASCE Journal of Infrastructure Systems until 2018, and is on the editorial boards of the journals Reliability Engineering and System Safety and Performability Engineering. He previously completed a three-year terms on the governing Councils of the International Society for Risk Analysis and the INFORMS Decision Analysis Society.

Dr. Guikema's research is highly interdisciplinary. Much of his group's recent work is focused on the problems of urban and infrastructure resilience and sustainability in a changing climate, though areas of application are broad. It is grounded in risk analysis, particularly data-drive risk analysis and complex systems simulation. One major topic is developing, testing, and implementing risk analysis methods based in machine learning, stochastic and agent-based simulation, game theory, and decision analysis. Another strong research thrust in the group is using modern simulation methods to more fully understand the role of human behavior in the evolution of vulnerability and risk in hazard-prone regions. This work is a combination of theory and practice, spanning from new methods development, testing, and validation to close interactions with utilities to develop and implement new methods for estimating performance and risk to infrastructure systems from disasters.

Industry Co-Chair Remarks: Wednesday, August 12, 2020, 9:30 – 9:40 am

Dr. Wilkistar Otieno, Associate Professor and Chair Industrial & Manufacturing Engineering, University of Wisconsin-Milwaukee, USA

Wednesday Keynote I: August 12, 2020, 9:40 – 10:20 am

Cheryl Thompson



Founder and CEO of CADIA

Center for Automotive Diversity, Inclusion & Advancement

Detroit, Michigan

Talk Title:

Cheryl Thompson is the founder of the Center for Automotive Diversity, Inclusion & Advancement (CADIA). CADIA supports Diversity and Inclusion for the Automotive Industry by providing professional development for individuals, along with resources, programs and tools that drive organizational evolution. A veteran of the automotive industry, Cheryl has over 30 years of experience at Ford Motor Company and American Axle and Manufacturing in positions ranging from skilled trades, operations, engineering and global leadership. She is trained in diversity and inclusion, career and leadership coaching and is Six Sigma trained and certified as a Black Belt. Cheryl has been recognized as a 2019 Influential Women in Manufacturing Honoree, a 2019 Corp Magazine Salute to Diversity award

winner, and is the recipient of two Diversity and Inclusion Awards from Ford Motor Company. A sought-after voice and speaker in the automotive, manufacturing and aerospace & defense industries, Cheryl has performed keynote addresses, workshops and breakout sessions for a number of companies and events, including TEDx Windsor, Women in Manufacturing (WiM), the American Automotive Summit, and Society of Women Engineers (SWE).

Wednesday Keynote II: August 12, 2020, 10:20 – 11:00 am

Jeffrey Abell, Ph.D., FSME, PE



Director, Manufacturing Systems Research Lab

Chief Scientist for Global Manufacturing

Global Research & Development

General Motors Company

Warren, Michigan

Dr. Jeffrey Abell is Director and Chief Scientist of Manufacturing Systems Research at General Motors. He is responsible for manufacturing research in the company including vehicle electrification, lightweight materials processing, automation, and artificial intelligence/analytics. Previously, he was responsible for battery manufacturing research and his team played a key role in bringing the Chevy Volt advanced high power battery to production. He has successfully implemented various evolutionary based optimization methods to solve complex industrial design problems and was awarded the 2011 and 2014 General Motors Boss Kettering Awards for outstanding technical innovation. He has a Bachelor's of Mechanical Engineering degree from General Motors Institute (now Kettering University), and graduate degrees in Systems Engineering from Oakland University.

Dr. Abell has also held a number of positions in the product development and manufacturing engineering at GM, Delphi, and DaimlerChrysler, including two

international assignments.



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ID 036 Does driver-passenger conversation affect safety on the road?

M Mahachandra 1,2, H Prastawa 1,2 and A H Mufid 1

1 Industrial Engineering Department, University of Diponegoro, Semarang, Indonesia

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ID 040 Supply Chain Network Optimization Strategy in Last-Mile Delivery Using Crowdsourced Approach: A Case Study

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ID 541 Determinre the Enterprise Risk Management Factors Effects on the Malaysian Mtun Universities Performance

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ID 542 Food Supply Chain Optimization Modelling in the Rice Crop Post Harvesting in the Philippines: An Agroecological Approach in Food Sustainability

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ID 543 Modelling an Automobile Assembly Layout Plant Using Probabilistic Functions and Discrete Event Simulation

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ID 556 Wireless Sensor Networks for Soil Nutrition to Increase Agricultural Productivity

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ID 557 Application of Blockchain Technology in Optimizing E-tailer Supply Chain Costs: Public and Consortium Blockchains

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ID 561 Designing The Iron Sandbag for Knee Osteoarthritis Exercise Tool

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ID 562 Variation in pain threshold and tolerance in high-risk school children

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ID 563 Use of Ultrasonic Sensor to Guide the Visually-Impaired Poster Competition

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ID 564 System Analysis: A Literature Review

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ID 565 Testing Which Juice Loses the Least Amount of Vitamin C Over Time

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ID 566 A Parallel Randomized Approximation Algorithm for Single Machine Scheduling With Applications to Flow Shop Scheduling

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ID 567 Stochastic Optimization Methods for Resource Management in Edge Computing Systems

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ID 568 Applying Structural Equation Model to Develop Enterprise Risk Management Model for Malaysian Mtun Universities Performance

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ID 574 Correlations Analysis of Hand Eye Coordination and Agility Athlete Cricket Bekasi City

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ID 575 Innermost Hone Model To Enhance The Competency Of Teachers In Evolving Teaching Materials

Does Driver-Passenger Conversation Affect Safety on The Road?

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Abstract

Distraction to driving activity can arise from inside or outside the vehicle. Passenger presence is believed to be one of the in-vehicle distractions. However, the existence of a passenger also crucial for drivers to minimize the monotony ambience. In this study, the conversation between the passenger and driver will be the focus of discussion in determining the distraction phenomenon. This study uncovers the effect on the conversation to the driver's performance through laboratory simulation experiments. Three types of conditions were studied, i.e., driving alone with no passenger, driving with a passive passenger, and driving with an actively speaking passenger. Driver's alertness and performance while driving was monitored as the distraction effect on transportation safety. The alertness was indicated by the level of sleepiness obtained from ratio of α/β indicator using electroencephalograph measurement. The performance was monitored from accident frequency through the crash and near-crash indicator along the driving period. As expected, results showed that driving alone experienced the highest level of sleepiness than others. Surprisingly, the driving activity with an actively speaking passenger brought the highest number of accidents than others.

Keywords

Driver, passenger, distraction, safety and transportation.

1. Introduction

Distraction can be described as anything that redirects the driver's attention to the normative characteristics. Distraction may reduce the performance and concentration of the driver. According to Carney et al. (2018), 59% of accidents are related to distraction affecting the driver. Distraction usually occurs outside the vehicle, such as billboards, collisions, or other occurrences that attract particular attention from the driver, lower his/her performance and attention (Mahachandra et al., 2020). Nevertheless, distraction can also come from inside the car. Some of the significant in-vehicle distractions are the use of smartphones and the existence of passengers inside the vehicle (Carney et al., 2018). Passenger presence may reduce the driver's performance and the driver's concentration, thereby increasing the risk of traffic accidents. Driving with passengers increases the risk of collision of vehicles by 96% (Rosenbloom and Perlman, 2016).

**DETERMINRE THE ENTERPRISE RISK MANAGEMENT FACTORS EFFECTS
ON THE MALAYSIAN MTUN UNIVERSITIES PERFORMANCE**

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ABSTRACT

Enterprise risk management (ERM) has been the centre of focus for many private organizations especially financial institutions. Like their counterparts, non-profit organizations are not safe from risk exposures and it is more crucial when their funding originated from the public. There is little work done on the enterprise risk management factors in the public organizations and research is needed to find out whether these organizations are serious in managing their risk and do they have a formal structure and framework to handle that. therefore, this study intended to develop enterprise risk management model (ERMM) that can be used to improve MTUN universities performance. Also, data will be collected from academicians at Malaysian Technical University Network (MTUN) which bring together four technology-based universities in Malaysia (the University Malaysia Perlis (UNMAP), Technical University of Malaysia Malacca (UTEM), the University of Tun Hussein Onn Malaysia (UTHM) and University of Malaysia Pahang (UMP). The outcome of the study will be encouraging, as it indicated that ERM factors of this study would have varying levels of influence on university performance. The contribution of the current study would be the improvement of the operations management (performance) and risk management practices by producing high quality publications, get good quality of international students, get high ranking and good reputation. It would assist top management in make the right decision that lead to improve the university performance in control the risk in the university.

Keywords: *Enterprise Risk Management, ERM Factors, Malaysian MTUN and Performance*

1. Introduction of Study

Enterprise risk management in higher education is viewed as a comprehensive process of managing risks across universities that may affect the achievement of the university's objectives as it relates to its core activities in Teaching & Learning, research and service (Abraham, Baird, & Neugebauer, 2013; Association of Governing Boards of Universities & Colleges & United Educators, 2014 and Cameron, 2017). Because of this, Cameron, (2017) explains that there are five distinguishing features of ERM in higher education in comparison with traditional perspectives of risk and risk management. In the first instance, there is a dual perspective of risk in higher education. Risks are considered opportunities (positives) and threats or hazards (negatives) to the HEI (Clyde-Smith, 2014). In this instance, Cameron, (2017) argues that ERM involves managing the opportunities and

Food Supply Chain Optimization Modelling in the Rice Crop Post Harvesting in the Philippines: An Agroecological Approach in Food Sustainability

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Abstract

The agricultural sector contributes fourteen percent to the Philippines' gross domestic product; however, the country's staple food requirement is still insufficient as data show a 16.4% loss in the post-harvesting process of rice crops due to the conventional way of harvesting. The purpose of this study is to provide an optimized process flow model that will lessen the loss incurred in the agro-food supply chain process. Literature reviews were done to validate the gathered data among government agencies, and through the use of Analytical Hierarchy Process (AHP), key variables were identified in determining the relative weights and criteria fitted in the model. Results show that type of seeds, timely harvest, temperature management, moisture content, and ethylene production are relevant factors that cause food loss in the agro-food supply chain. The recommendation includes the establishment of an integrated internet of things (IoT) process incorporating the key variables beneficial for the stakeholders.

Keywords:

Food Supply Chain, Rice Production, Post-harvest, AHP, Optimization

1. Introduction

The Philippines has a population of 104 million people, and seventy percent (70%) of its people depend on its agricultural sector (FAO, 2018). According to FAO (2007), rice is considered to be the most important staple crop in the country with its wide diversity, as eighty-nine percent (89%) of the entire population depends on it. Among the Southeast Asian nations, the Philippines ranked fourth as a rice producer with an estimated yield of 4.08 tons per hectare (USDA, 2015); however the country is not self-sufficient in its staple food requirements (Andales and Gragasin 2000; Castro, 2006) as 16.4 percent loss recorded in the post-harvesting process of rice crops due to the traditional production practiced (PhilMech, 2010) and lack of proper handling and equipment (Mopera, 2016). The Filipinos recorded a total waste of 987,952 kilograms of rice daily (FNRI, 2015). About one-third of the total food produced goes to waste in both developing and developed countries, equivalent to 1.3 billion tons of food loss per year, which can feed about 2 billion people each year (FAO, 2013).

The food supply chain is a process in which food travels from the producers to reach the consumers (Wunderlich & Martinez, 2018) and the impact of losses affect the economic standing of the Philippines' rice production, provided the agricultural sector contributes 14 percent to the Philippines' gross domestic product. Seventeen percent (17%) of rice losses are associated with the absence of poor post-harvesting facilities and practices (Philippine Star, 2018) and attributed due to factors such as the type of seeds, timely harvest, temperature management, moisture content, and ethylene production (IRRI, 1999). Based on the interview, the farmers' lack of experience and knowledge in post-harvesting aside from poor harvesting techniques incurs losses such as manual drying that resulted in the susceptibility of grain. In addition, storage also incurs losses as rodents and other pests cause the rice not to be fit for consumption.

Application of Blockchain Technology in Optimizing E-tailer Supply Chain Costs: Public and Consortium Blockchains

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Abstract

Blockchain technology implementation is becoming an increasing trend in supply chain operations around the globe. However, the blockchain costs and its impact on the supply chain operational outcomes are still unclear in the literature. Specially, online retail (e-tailer) supply chains can derive significant benefits from blockchain implementation, as they heavily rely on accurate information and proper information sharing among the supply chain members, who are located distantly and externally. The rapid sales growth in the e-tailer supply chains further reinforces the importance of identifying the costs of implementing a blockchain system to derive insights for strategic decisions to improve the operational effectiveness of these supply chains. Therefore, we investigate the cost determinants of public and consortium blockchains in an operational framework of the e-tailer supply chain. The findings emphasize that the transaction fee is a determining factor, and the public blockchain operations are costly in long term operations than the consortium blockchain operations.

Keywords

Blockchain technology, Consortium blockchain, Cost minimization, E-tailer supply chain, Public blockchain

1. Introduction

E-commerce supply chain operations are growing at an exponential rate around the globe due to the lifestyle changes of consumers towards online shopping, thus enabling a large number of e-tailing networks (Li et al. 2020). The present global pandemic skyrocketed the online retailing as consumers have shifted towards online shopping even for the basics such as groceries (Savage 2020). It also generates extreme levels of uncertainty for the e-commerce supply chain operations, along with the increased demand levels (Elrhim and Elsayed 2020). Therefore, e-commerce supply chains require innovative strategies to improve and streamline the operations, which can be obtained by implementing disruptive technologies such as blockchain. Blockchain is one of the best disruptive technologies, which has the potential to enhance the supply chain business processes and transform the traditional operations towards improved supply chain performances (Wamba et al. 2020). The inherent features of blockchain such as decentralized operations, immutable data storage and management create an impact on the supply chain relationships, data management, and enhanced visibility of the supply chain operations (Wang et al. 2019). For e-commerce supply chains, effective information sharing is an essential requirement, as the operations mainly rely on the information than the physical attributes, which blockchain technology showcase a promising impact. The exponential growth of the e-tailer networks increases competition among the supply chains, thereby emphasizing the need for minimizing costs while streamlining the processes (Strand and Strandänger 2016). Even though the benefits of blockchain are widely identified, the investigations of blockchain applications in the supply chains are still in primary stages (Queiroz et al. 2019, Schmidt and Wagner 2019, Wamba and Queiroz 2020) and the knowledge related to the implications of blockchain in supply chain management is scant (Treiblmaier 2018). Moreover, no study is found in the literature, which explores the cost analysis of blockchain implementation in supply chain networks.

Blockchains are segregated into three main frameworks based on their operational setting and the level of decentralization as public, private and consortium blockchains (Zheng et al. 2017, Dib et al. 2018). The different