

Building Logistics Capabilities through Third-party Logistics Relationships Using COPRAS Method

*¹Jasvinder Kaur, ²M. Ramachandran, ²Sathiyaraj Chinnasamy, ²Prabakaran Nanjundan

¹G H Raison College of Commerce, Science & Technology, Nagpur, India

²REST Labs, Kaveripattinam, Krishnagiri, Tamil Nadu, India

*Corresponding author Email: jasvinder.kaur@raisoni.net

Abstract. The 3PL logistics service is primarily for all modes of transportation and storage for automobiles, Tesla Energy, batteries and/or related components to factories, service centers and other components integral to the successful operation of other Tesla companies. A 3PL (Third Party Logistics) Provider Outsourced Provides done logistics services, including one or more purchases, and Involves managing fulfillment activities. In business, 3PL means warehousing or shipping and refers to any service agreement that includes goods. The Complex Proportional Rating (COPRAS) Increase index values A reduction method is used the effect of increasing and decreasing the indices of the attributes is considered separately in the result assessment. Alternative: Operational efficiency, customer operations Integration, vertical or horizontal integration, supply chain management and Integration. Evaluation option: % of personnel in gen. mgmt and business development, % of services is value - added, Expected annual growth rate 1995-1998 in %, Competencies, Skills lacking. The result it is seen that % of services is value - added is got the first rank where as is the Competencies is having the lowest rank. The value of the dataset for Third-party logistics in COPRAS method shows that it results in % of services is value - added Decision and top ranking.

Keywords: 3PL, Operational efficiency, customer operations Integration, vertical or horizontal integration, supply chain management.

1. Introduction

A kind of compromise can be seen in broad and narrow views of TPL. Bask's definition describes TPL as "relationships between interfaces between supply chains and third-party logistics providers, based on customized, short- or long-term relationships, with efficiency and purpose". [1] Third party logistics selection result based on n criteria and methods. This review of 3PL selection is empirical and Region/Country, Industry, and Outsourcing Related to logistics operations performed reveals that [2] Third-Party Logistics Services Degree of commitment to use significantly varied among respondents. More than three-quarters of users use contract services their company's commitment to feedback is rated moderate" or "extensive". [3] This is an important gap, esp In foreign trade and logistics activities In light of the high growth rates observed, And third party logistics service in this region Use of providers in Europe as well Following the pattern found in the US, A significant increase. [5] Growth of Third Party Logistics (TPL) business Enter many companies from different industries led to this sector. New entrants are existing business and it's highly influenced by the network is paid development of strategy over time, paying special attention to how their different strategies General problem-solving skills and Degree of customer adaptation the balance between [7] Transaction costs are prescribed by law Work can be simplified by outsourcing increased confidence in a relationship. Therefore, in future 3PL research, another theory that can be integrated is social exchange the theory is. Some of the social exchange theory KEY PRINCIPLES Each member shall a diet like Shipper 3PL relationship, [8] A 3PL provider as a lead logistics provider or affiliated with a host of 3PL providers To act as a fourth-party logistics (4PL) provider can [9] Production TPL per company and its TPL Good relations between providers are also required. This relationship requires constant maintenance. You when finding the right TPL provider, company Cost savings, productivity improvements, hassle-free Non-stop functionality, and scalable service Expect improvements. [10] Third-party logistics services in Malaysia. An Experienced Malaysian logistics companies to what extent the services of the companies A study to determine the use of The study was conducted; The period in which these were used; For the selection of contract logistics Decision making process and its impact on the organization. [11] The remainder of this paper is organized as follows has been done. First, the structure of the survey we describe, secondly, a shipper and some of the collaboration between TPL providers from their survey of characteristics we describe. Next, driving [12] the cooperation between the parties is long-term Nature is interconnected and most organizations and information With changes in settings are attached. Solutions for specific services are tailored, and to name a few, Final assembly, packaging, and quality control and include value-added services such as information services. [13] Firms' experience also provides insights into How to plan implementation; For example, a This to a third party logistics service provider The need to teach about company's needs. Plans should also be developed to recruit laid-off employees. [14] The use Third-Party Logistics Services (3PL) as an important part of logistics has changed strategies of many US companies. From an aggregate perspective, the annual market for such services is now estimated to exceed \$50 billion annually. The buying process has become more complex, [15] the remaining sections regarding third-party logistics performance measurement Discussion, Affiliate Relationship Marketing dimensions, and 3PL performance measures, between method and discussion Theoretical model results of possible

connections. The final section summarizes study, [16] Operational efficiency for 3PL providers and Relationship between financial performance Simple regression analysis to estimate was used. Customers are key Priorities and funding for 3PL providers between performance-related service competencies To determine whether functional performance is mediated Simple and multiple regression analyzes were conducted. [17]

Comparison of the value- added and basic segments:

- % of personnel in gen. mgmt and business development
- % of services is value - added
- Expected annual growth rate 1995-1998 in %
- Competencies
- Skills lacking

Taxonomy of value creation by TPL- providers:

- Operational Efficiency
- Integration of Customer Operations
- Vertical or Horizontal Integration
- Supply chain management and integration

2. Materials and Methods

The MCDM method COPRAS was first introduced in 1994 reported. This is time directly proportionally Based on values and weights. Criterion system and criteria that adequately describe the alternatives, the importance and utility of the studied versions. The determination is carried out in five stages of importance, order of priority and degree of application The Sequence of building operations when to Replace Windows Determines whether to Resources when funding becomes available will be scarce, and public buildings Managers often replace the windows with the building. Envelopes Start by updating. Customer needs One faces some problems in choosing different types of windows to complete, ESP in terms of Cost-quality relationship. Above is the Complexity Ratio Rating of Multiple Criteria (COPRAS) was Created by the authors, it Aiming to solve problems contains MCDM method, MCDM The method offers the opportunity to reduce COPRAS, efficient Select a Windows contractor. Low power selection allows a Windows contractor to do more by using this method an accurate assessment of the customer's needs and the costs of replacing the cutting window [23]. Decision makers evaluate and weight the alternatives and criteria, respectively And while there are uncertainties in definition, fuzzy theory accounts for existing uncertainties Provides a suitable tool to handle. In this paper, to evaluate a possible maintenance strategy of COPRAS and AHP A new based on comments Fuzzy MCDM method proposed Linguistic terms for estimating ratings and weights are used. MCDM problems based on Fuzzy AHP and COPRAS By Fuzzy AHP for solving integrated criteria calculated. Maintenance is COPRAS technique used to evaluate strategies [24]. SWARA review and weighting criteria and COPRAS are used to evaluate and rank alternatives. Experts from various disciplines DECISION ABOUT SWARA AND COPRAS participated in this research to do. Biomedical Micro electron Four majors including Systems Nanotechnology, Biotechnology and Biomedical Engineering Technical industries are the target of this research. In terms of Iran's potential these industries were selected. The Conclusion Nanotechnology is a priority in Iran shows that Methodology and others of research this is among other problems in the areas the method is useful [25]. The COPRAS method is superior to Most For comparison, Available classical MADM methods, which are alternatives another alternative is to evaluate the usage level Alternative methods in addition to estimating market value. Is intended [26] to help decision makers finalize their decisions. However, Fuzzy Cobras is legit leading to poor Performance and high cost. In this paper, to propose a method for dealing with FMCGTM problems, Background Cobras Method of Proposed SIM HFNs for Fuzzy Environment. Is extended. Further, The Alternative use of proposed fire emergency Illustrated using an evaluation problem [27]. Very eco-friendly for manufacturers Green supplier evaluation has become very important for supply chain in industry important challenges. Seven Greens Fuzzy AHP and Fuzzy COBRAS Suppliers and Best Green integrate this survey and evaluate suppliers Aims to select [29]. Green Supplier Performance Criteria Fuzzy AHP is used to determine the importance. With uncertainty considered in this study Criteria and Options and ambiguity are related. [29]

- **Skills lacking:** Phobic individuals may exhibit poor social performance in general rather than exhibiting a single or specific skill deficit relative to their non-socially phobic peers.
- **Competencies:** Key Roles of Distance Education Professionals, Identifying outputs and capabilities First of all. Second every release and Assessing the importance of competence. Thirdly, which skills are used most often? Finding that character.
- **Operational Efficiency:** Global competition among financial intermediaries, to increase the efficiency of their operations should, thereby reducing costs and from optimal production plans Deviation should also be encouraged. Functional Capability requires: (1) Completing any economies of scale and scope Optimizing the output mix using; and (2) improving the input mix, thus avoiding both input utilization and suboptimal relative ratios of inputs.
- **Integration of Customer Operations:** Empirically identifying Customer Integration and Functionality performance and customer integration and between functional performance the mediating role of information quality in the direct relationship. And relationships between constructs are analyzed through regression analysis. The results show some information quality

- **Vertical or Horizontal Integration:** The driving force behind facilitating problem solving is vertical and horizontal integration. The methodology used for the instructional design of learning and assessment was discussed to facilitate vertical and horizontal integration.
- **Supply chain management and integration:** Introducing an environmental quality system into a company's processes can be seen as the closest parallel to implementing a total quality management (TQM) system. The changes required do not just involve processes products, but also organizational culture.

3. Analysis and Discussion

TABLE 1. Third-party logistics in data set

	Operational Efficiency	Integration of Customer Operations	Vertical or Horizontal Integration	Supply chain management and integration
% of personnel in gen. mgmt and business development	81.08	459.5	249.15	422.05
% of services is value - added	79.12	445	220.69	327.3
Expected annual growth rate 1995-1998 in %	64.08	656.6	243.18	423.1
Competencies	43.17	736.3	223.6	517.59
Skills lacking	73.33	456.4	227.96	318.89

This table 1 shows that the value of dataset for Third-party logistics in COPRAS method Alternative: Operational efficiency, customer operations Integration, vertical or horizontal integration, supply chain management and Integration. Evaluation option: % of personnel in gen. mgmt and business development, % of services is value - added, Expected annual growth rate 1995-1998 in %, Competencies, Skills lacking. Operational Efficiency it is seen that % of personnel in gen. mgmt and business development is showing the highest value for Competencies the lowest value. Integration of Competencies is showing the highest value for % of services is value - added is showing the lowest value. Vertical or Horizontal Integration it is seen that % of personnel in gen. mgmt and business development is showing the highest value for Competencies is showing the lowest value. Supply chain management and Competencies is showing the highest value for Skills lacking is showing the lowest value.

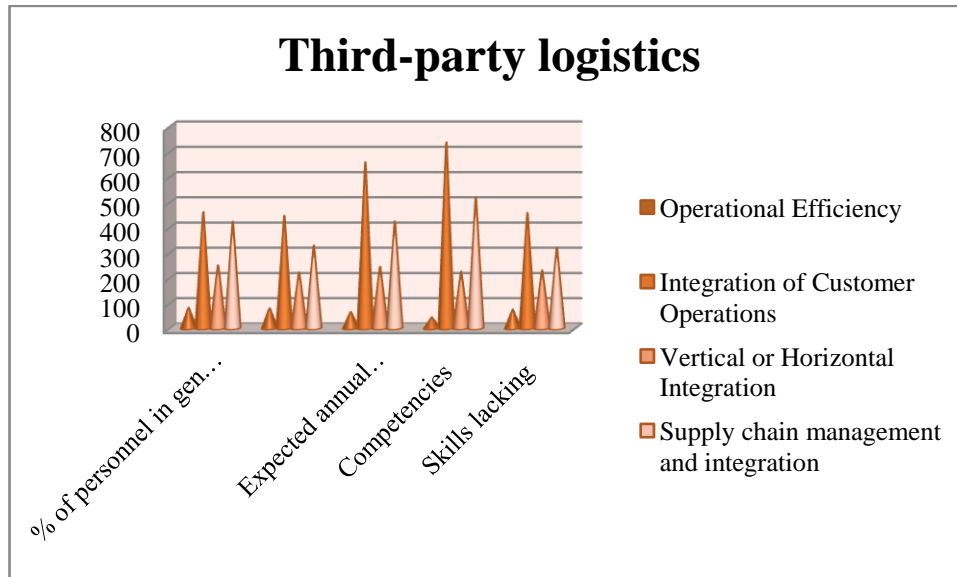


FIGURE 1. Third-party logistics

Figure 1 shows that the value of dataset for Third-party logistics in COPRAS method Alternative: Operational efficiency, customer operations Integration, vertical or horizontal integration, supply chain management and Integration Evaluation option: % of personnel in gen. mgmt and business development, % of services is value - added, Expected annual growth rate 1995-1998 in %, Competencies, Skills lacking.

TABLE 2. Third-party logistics in Normalized Data

Normalized Data			
Operational Efficiency	Integration of Customer Operations	Vertical or Horizontal Integration	Supply chain management and integration
0.2379	0.167	0.21394	0.2101
0.2322	0.162	0.1895	0.1629
0.188	0.238	0.20881	0.2106
0.1267	0.267	0.192	0.2576
0.2152	0.166	0.19574	0.1587

$$X_{n1} = \frac{X1}{\sqrt{((X1)^2+(X2)^2+(X3)^2 \dots)}} \quad (1).$$

Table 2 shows the various Normalized Data High values of multiple criteria decision making (MCDM), Third-party logistics. The normalized value is obtained using formula (1). Weight used for analysis Table 3 shows the age. We took the same weight for all the parameters for analysis

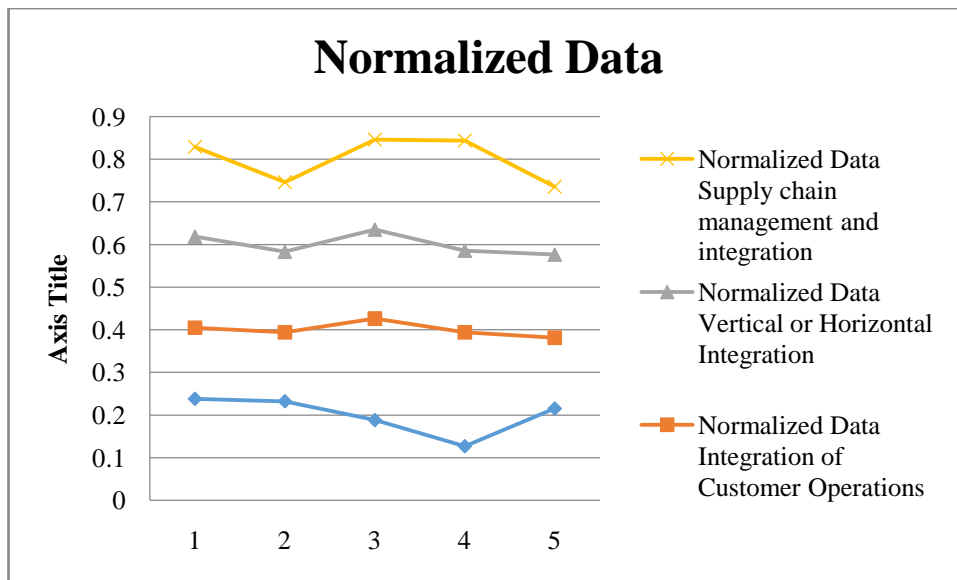


FIGURE 2. Normalized Data

Figure 2 shows Normalized Data for % of personnel in gen. mgmt and business development, % of services is value - added, Expected annual growth rate 1995-1998 in %, Competencies, Skills lacking.

TABLE 3. Third-party logistics in Weight age

Weight			
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25
0.25	0.25	0.25	0.25

$$X_{wnormal1} = X_{n1} \times w_1 \quad (2)...$$

TABLE 4. Third-party logistics in Weighted normalized result matrix

Weighted normalized decision matrix			
0.059481	0.04	0.05	0.05
0.058043	0.04	0.05	0.04
0.04701	0.06	0.05	0.05
0.03167	0.07	0.05	0.06
0.053796	0.04	0.05	0.04

Table 4 shows weighted normalized decision matrix for % of personnel in gen. mgmt and business development, % of services is value - added, Expected annual growth rate 1995-1998 in %, Competencies, Skills lacking. Based decision weighted normalized decision matrix, we used the formula (2).

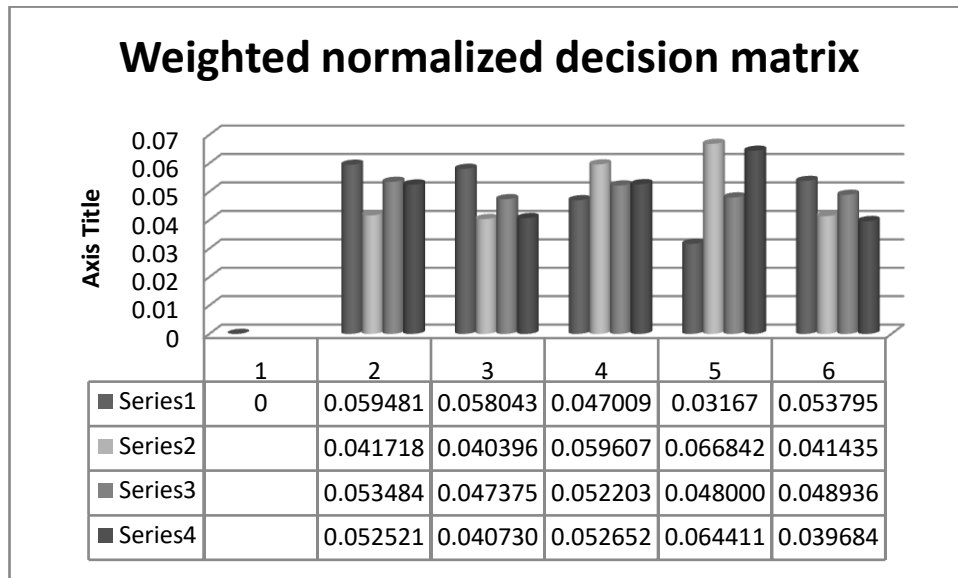


FIGURE 3. Weighted normalized decision matrix

Figure 3 shows weighted normalized decision matrix for % of personnel in gen. mgmt and business development, % of services is value - added, Expected annual growth rate 1995-1998 in %, Competencies, Skills lacking.

TABLE 5. Third-party logistics in Bi, Ci, Min (Ci)/Ci, Qi, Ui,

	Bi	Ci	Min(Ci)/Ci	Qi	Ui
% of personnel in gen. mgmt and business development	0.1012	0.106007	0.83114	0.194599	92.3
% of services is value - added	0.0984	0.088106	1	0.210815	100
Expected annual growth rate 1995-1998 in %	0.1066	0.104856	0.84026	0.201042	95.4
Competencies	0.0985	0.112411	0.78378	0.186591	88.5
Skills lacking	0.0952	0.08862	0.9942	0.206954	98.2

This table 5 shows that from the Bi, Ci, Min (Ci)/Ci, Qi, Ui, Operational efficiency, customer operations Integration, vertical or horizontal integration, supply chain management and Integration Evaluation option: % of personnel in gen. mgmt and business development, % of services is value - added, Expected annual growth rate 1995-1998 in %, Competencies, Skills lacking.

TABLE 6. Third-party logistics in Rank

	Rank
% of personnel in gen. mgmt and business development	4
% of services is value - added	1
Expected annual growth rate 1995-1998 in %	3
Competencies	5
Skills lacking	2

Table 6 shows the final result of this paper the % of services is value - added is in 1st rank, Skills lacking is in 2nd rank, Expected annual growth rate 1995-1998 in % is in 3rd rank , % of personnel in gen. mgmt and business development s is in 4th rank and Competencies is in 5th rank. The final result is done by using the DEMATEL method.

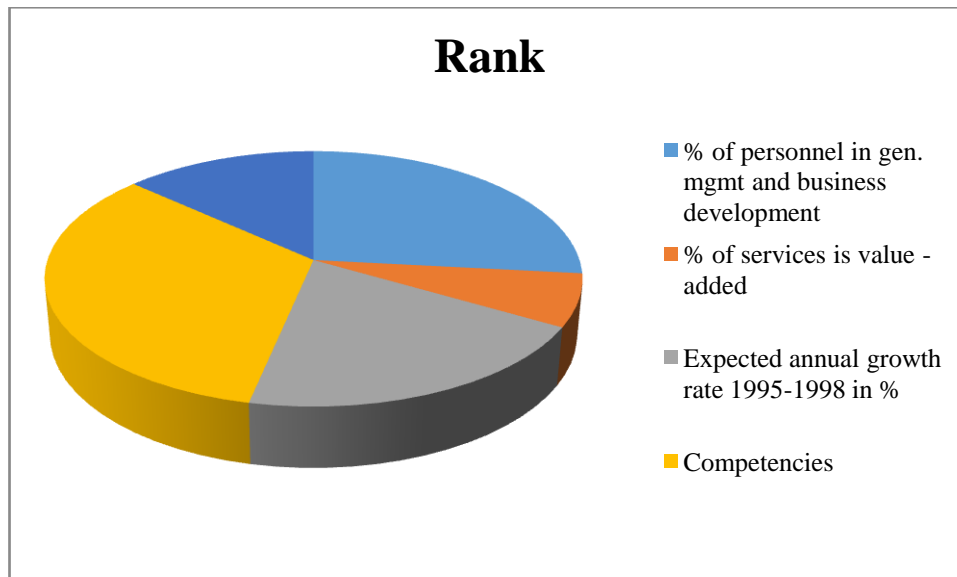


FIGURE 4. Rank

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4. Conclusion

The result it is seen that % of services is value - added is got the first rank where as is the Competencies is having the lowest rank. Production TPL per company and its TPL Good relations between providers are also required. This relationship requires constant maintenance. You when finding the right TPL provider, company Cost savings, productivity improvements, hassle-free Non-stop functionality, and scalable service Expect improvements. Third-party logistics services in Malaysia. An Experienced Malaysian logistics companies to what extent the services of the companies a study to determine the use of the study was conducted; the period in which these were used; for the selection of contract logistics Decision making process and its impact on the organization. Third-Party Logistics Services Degree of commitment to use significantly varied among respondents. More than three-quarters of users use contract services their company's commitment to feedback is rated ``moderate" or ``extensive". This is an important gap, ESP In foreign trade and logistics activities In light of the high growth rates observed, and third party logistics service in this region Use of providers in Europe as well Following the pattern found in the US, A significant increase. Envelopes Start by updating. Customer needs One faces some problems in choosing different types of windows to complete, ESP in terms of Cost-quality relationship. Above is the Complexity Ratio Rating of Multiple Criteria (COPRAS) was Created by the authors, it Aiming to solve problems contains MCDM method, MCDM The method offers the opportunity to reduce COPRAS, efficient Select a Windows contractor. Low power selection allows a Windows contractor to do more by using this method an accurate assessment of the customer's needs and the costs of replacing the cutting window.

Reference

- [1]. Yazdani, Morteza, Ali Alidoosti, and Edmundas Kazimieras Zavadskas. "Risk analysis of critical infrastructures using fuzzy COPRAS." *Economic research-Ekonomska istraživanja* 24, no. 4 (2011): 27-40.
- [2]. Kaklauskas, Arturas, Edmundas Kazimieras Zavadskas, Saulius Raslanas, Romualdas Ginevicius, Arunas Komka, and Pranas Malinauskas. "Selection of low-e windows in retrofit of public buildings by applying multiple criteria method COPRAS: A Lithuanian case." *Energy and buildings* 38, no. 5 (2006): 454-462.
- [3]. Kshirsagar, Pravin, and Sudhir Akojwar. "Classification & detection of neurological disorders using ICA & AR as feature extractor." *Int. J. Ser. Eng. Sci. IJSES* 1, no. 1 (2015).
- [4]. Fouladgar, Mohammad Majid, Abdolreza Yazdani-Chamzini, Ali Lashgari, Edmundas Kazimieras Zavadskas, and Zenonas Turskis. "Maintenance strategy selection using AHP and COPRAS under fuzzy environment." *International journal of strategic property management* 16, no. 1 (2012): 85-104.
- [5]. Paliwal, Shweta, Amit Kumar Mishra, Ram Krishn Mishra, Nishad Nawaz, and M. Senthilkumar. "XGBRS Framework Integrated with Word2Vec Sentiment Analysis for Augmented Drug Recommendation."
- [6]. Hashemkhani Zolfani, Sarfaraz, and Mohsen Bahrami. "Investment prioritizing in high tech industries based on SWARA-COPRAS approach." *Technological and Economic Development of Economy* 20, no. 3 (2014): 534-553.

- [7]. Chidambaram, P. K., Dr Amol Lokhande, Dr M. Ramachandran, Vimala Saravanan, and Vidhya Prasanth. "A Review on Biodiesel Properties and Fatty acid composites." *REST Journal on Emerging trends in Modelling and Manufacturing* 7, no. 3 (2021): 87-93.
- [8]. Shitharth, S., Pratiksha Meshram, Pravin R. Kshirsagar, Hariprasath Manoharan, Vineet Tirth, and Venkatesa Prabhu Sundramurthy. "Impact of Big Data Analysis on Nanosensors for Applied Sciences using Neural Networks." *Journal of Nanomaterials* 2021 (2021).
- [9]. Rathi, K., and S. Balamohan. "A mathematical model for subjective evaluation of alternatives in fuzzy multi-criteria group decision making using COPRAS method." *International Journal of Fuzzy Systems* 19, no. 5 (2017): 1290-1299.
- [10]. Singh, Ninni, Vinit Kumar Gunjan, Amit Kumar Mishra, Ram Krishn Mishra, and Nishad Nawaz. "SeisTutor: A Custom-Tailored Intelligent Tutoring System and Sustainable Education." *Sustainability* 14, no. 7 (2022): 4167.
- [11]. Garg, Harish, and Rishu Arora. "Algorithms based on COPRAS and aggregation operators with new information measures for possibility intuitionistic fuzzy soft decision-making." *Mathematical Problems in Engineering* 2020 (2020).
- [12]. Khan, Hera, Ayush Srivastav, and Amit Kumar Mishra. "Multiclass Intent Analysis: Beyond the Conventional Polarities." *ECS Transactions* 107, no. 1 (2022): 7119.
- [13]. Nakhaei, Jalal, Shahin Lale Arefi, Mahdi Bitarafan, and Simona Kildienė. "Evaluation of light supply in the public underground safe spaces by using of COPRAS-SWARA methods." *International Journal of Strategic Property Management* 20, no. 2 (2016): 198-206.
- [14]. Fegade, Vishal, M. Ramachandran, S. Madhu, C. Vimala, R. Kurinji Malar, and R. Rajeshwari. "A review on basalt fibre reinforced polymeric composite materials." In *AIP Conference Proceedings*, vol. 2393, no. 1, p. 020172. AIP Publishing LLC, 2022.
- [15]. Torabzadeh Khorasani, Sasan. "Green supplier evaluation by using the integrated fuzzy AHP model and fuzzy copras." *Process Integration and Optimization for Sustainability* 2, no. 1 (2018): 17-25.
- [16]. Khan, Hera, Ayush Srivastav, Amit Kumar Mishra, and Tien Anh Tran. "Machine learning methods for estimating permeability of a reservoir." *International Journal of System Assurance Engineering and Management* (2022): 1-14.
- [17]. Bathrinath, S., S. Venkadesh, S. S. Supriyan, K. Koppiahraj, and R. K. A. Bhalaji. "A fuzzy COPRAS approach for analysing the factors affecting sustainability in ship ports." *Materials Today: Proceedings* 50 (2022): 1017-1021.
- [18]. Kshirsagar, PRAVIN R., SUDHIR G. Akojwar, and R. A. M. K. U. M. A. R. Dhanoriya. "Classification of ECG-signals using artificial neural networks." In *Proceedings of International Conference on Intelligent Technologies and Engineering Systems, Lecture Notes in Electrical Engineering*, vol. 345. 2017.
- [19]. Baker, Sarah R., and Robert J. Edelmann. "Is social phobia related to lack of social skills? Duration of skill-related behaviours and ratings of behavioural adequacy." *British Journal of Clinical Psychology* 41, no. 3 (2002): 243-257.
- [20]. Sundaramurthy, Shanmugam, C. Saravanabhavan, and Pravin Kshirsagar. "Prediction and classification of rheumatoid arthritis using ensemble machine learning approaches." In *2020 International Conference on Decision Aid Sciences and Application (DASA)*, pp. 17-21. IEEE, 2020.
- [21]. Thach, Elizabeth C., and Karen L. Murphy. "Competencies for distance education professionals." *Educational technology research and development* 43, no. 1 (1995): 57-79.
- [22]. Allen, Linda, and Anoop Rai. "Operational efficiency in banking: An international comparison." *Journal of banking & Finance* 20, no. 4 (1996): 655-672.
- [23]. Nautiyal, Aditi, and Amit Kumar Mishra. "Machine learning approach for intelligent prediction of petroleum upstream stuck pipe challenge in oil and gas industry." *Environment, Development and Sustainability* (2022): 1-27.
- [24]. Chavez, Roberto, Wantao Yu, Cristina Gimenez, Brian Fynes, and Frank Wiengarten. "Customer integration and operational performance: The mediating role of information quality." *Decision Support Systems* 80 (2015): 83-95.
- [25]. Deepa, N., Asmat Parveen, Anjum Khurshid, M. Ramachandran, C. Sathiyaraj, and C. Vimala. "A study on issues and preventive measures taken to control Covid-19." In *AIP Conference Proceedings*, vol. 2393, no. 1, p. 020226. AIP Publishing LLC, 2022.
- [26]. Snyman, W. D., and J. Kroon. "Vertical and horizontal integration of knowledge and skills—a working model." *European Journal of Dental Education* 9, no. 1 (2005): 26-31.
- [27]. Kshirsagar, Pravin, and Dr Sudhir Akojwar. "Classification and Prediction of Epilepsy using FFBPNN with PSO." In *IEEE international conference on communication networks*, vol. 17. 2015.
- [28]. Lamming, Richard, and Jon Hampson. "The environment as a supply chain management issue." *British journal of Management* 7, no. 1 (1996).
- [29]. Farooqui, Nafees Akhter, Amit Kumar Mishra, and Ritika Mehra. "IOT based Automated Greenhouse Using Machine Learning Approach." *International Journal of Intelligent Systems and Applications in Engineering* 10, no. 2 (2022): 226-231.
- [30]. Marasco, Alessandra. "Third-party logistics: A literature review." *International Journal of production economics* 113, no. 1 (2008): 127-147.
- [31]. Selviaridis, Konstantinos, and Martin Spring. "Third party logistics: a literature review and research agenda." *The international journal of logistics management* (2007).
- [32]. Saravanan, Vimala, M. Ramachandran, and Sowmiya Soundharaj. "Understanding Various IOT healthcares and its Characterization." (2022).

- [33]. Aguezoul, Aicha. "Third-party logistics selection problem: A literature review on criteria and methods." *Omega* 49 (2014): 69-78.
- [34]. Akojwar, Dr Sudhir, Pravin Kshirsagar, and Vijetalaxmi Pai. "Feature extraction of EEG signals using wavelet and principal component analysis." In *National Conference on Research Trends In Electronics, Computer Science & Information Technology and Doctoral Research Meet*. 2014.
- [35]. Bhatnagar, Rohit, Amrik S. Sohal, and Robert Millen. "Third party logistics services: a Singapore perspective." *International Journal of Physical Distribution & Logistics Management* (1999).
- [36]. Arya, Vishakha, Amit Kumar Mishra, and Alfonso González-Briones. "Analysis of sentiments on the onset of Covid-19 using Machine Learning Techniques." *ADCAIJ: Advances in Distributed Computing and Artificial Intelligence Journal* 11, no. 1: 45-63.
- [37]. Hertz, Susanne, and Monica Alfredsson. "Strategic development of third party logistics providers." *Industrial marketing management* 32, no. 2 (2003): 139-149.
- [38]. Vaidyanathan, Ganesh. "A framework for evaluating third-party logistics." *Communications of the ACM* 48, no. 1 (2005): 89-94.
- [39]. Akojwar, Sudhir G., and Pravin R. Kshirsagar. "Performance evolution of optimization techniques for mathematical benchmark functions." *International Journal of Computers* 1 (2016).
- [40]. Aghazadeh, Seyed-Mahmoud. "How to choose an effective third party logistics provider." *Management research news* (2003).
- [41]. Sohail, M. Sadiq, and Amrik S. Sohal. "The use of third party logistics services: a Malaysian perspective." *Technovation* 23, no. 5 (2003): 401-408.
- [42]. Mishra, Amit Kumar, and Shweta Paliwal. "Mitigating cyber threats through integration of feature selection and stacking ensemble learning: the LGBM and random forest intrusion detection perspective." *Cluster Computing* (2022): 1-12.
- [43]. Halldórsson, Arni, and Tage Skjøtt-Larsen. "Developing logistics competencies through third party logistics relationships." *International Journal of Operations & Production Management* (2004).
- [44]. Saravanan, Vimala, M. Ramachandran, and Sowmiya Soundharaj. "Exploring Various Digital Communication and its Classification." (2022).
- [45]. Van Laarhoven, Peter, Magnus Berglund, and Melvyn Peters. "Third-party logistics in Europe—five years later." *International Journal of Physical Distribution & Logistics Management* (2000).
- [46]. Kshirsagar, Pravin R., Anil N. Rakhonde, and Pranav Chippalkatti. "MRI image based brain tumor detection using machine learning." *Test Engineering and Management* 81 (2020): 3672-3680.
- [47]. Skjøtt-Larsen, Tage. "Third party logistics—from an interorganizational point of view." *International journal of physical distribution & logistics management* (2000).
- [48]. Farooqui, Nafees Akhter, Amit Kumar Mishra, and Ritika Mehra. "Automatic crop disease recognition by improved abnormality segmentation along with heuristic-based concatenated deep learning model." *Intelligent Decision Technologies Preprint*: 1-23.
- [49]. Kshirsagar, Pravin R., and Sudhir G. Akojwar. "Prediction of neurological disorders using optimized neural network." In *2016 International Conference on Signal Processing, Communication, Power and Embedded System (SCOPEs)*, pp. 1695-1699. IEEE, 2016.
- [50]. Dapiran, Peter, Robert Lieb, Robert Millen, and Amrik Sohal. "Third party logistics services usage by large Australian firms." *International Journal of Physical Distribution & Logistics Management* (1996).
- [51]. Saravanan, Vimala, M. Ramachandran, and Vidhya Prasanth. "An Overview of Network Robot System and Its Applications." (2022).
- [52]. Lieb, Robert C., and Brooks A. Bentz. "The use of third-party logistics services by large American manufacturers: The 2003 survey." *Transportation Journal* (2004): 24-33.
- [53]. Farooqui, Nafees Akhter, Amit Kumar Mishra, and Ritika Mehra. "Concatenated deep features with modified LSTM for enhanced crop disease classification." *International Journal of Intelligent Robotics and Applications* (2022): 1-25.
- [54]. Knemeyer, A. Michael, and Paul R. Murphy. "Evaluating the performance of third-party logistics arrangements: a relationship marketing perspective." *Journal of supply chain management* 40, no. 4 (2004): 35-51.
- [55]. Kshirsagar, Pravin, Akshay Pote, K. K. Paliwal, Vaibhav Hendre, Pranav Chippalkatti, and Nikhil Dhabekar. "A review on IOT based health care monitoring system." *ICCCE 2019* (2020): 95-100.
- [56]. Liu, Chiung-Lin, and Andrew C. Lyons. "An analysis of third-party logistics performance and service provision." *Transportation Research Part E: Logistics and Transportation Review* 47, no. 4 (2011): 547-570.