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Analysis of the Role of Global Information Management in Advanced Decision Support Systems (DSS) for Sustainable Development

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ABSTRACT

Timely intelligent decision support systems (DSS) are increasingly important for the sustainable development of entrepreneurship. Global information management plays an important role in accurate DSS. Judgments can be made more quickly, accurately, and objectively thanks to the availability of large data and sophisticated artificial intelligence in the realm of quantitative smart decisions. In this context, this research analyzes the contribution of global information management for sustainable business development through DSS. This paper used the Scopus database to collect relevant research papers related to the research topic. This research helps researchers analyze the recent trend and development in the field of DSS in the context of global information management.

KEYWORDS

Decision Support System, Entrepreneurship, Information Management, Sustainable Development

INTRODUCTION

People must make choices on a regular basis and sometimes in the split second that separates two options. Some judgments are crucial while others are not, and it is seldom possible to make a choice in isolation from the actions of others. Access to information and how that information is processed may also affect the quality of decisions. When more specific data are collected, a more comprehensive understanding can be built and better choices can be made. Due to this, there is a need for an intelligent decision support system that can help people make better decisions when they have limited access to relevant data and expertise (Zhou et al., 2015; Sarkissian & Tekli, 2021; Ren et al., 2021; Gaurav et al., 2022). To aid in the process of making decisions, organizations often use what is known as a "decision support system" (DSS), which is an information system. DSSs are used primarily to help the user at the strategic, tactical, and operational levels (Sriyanto et al., 2019; Almomani et al., 2022; Ginzarly, 2021; Wu et al., 2018).As everyone, from people to governments to NGOs to enterprises,

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relies on making sound and well-considered decisions. The ability to make good choices at the right moment is becoming more and more crucial in today's world. Smarter, more timely judgments may be made with the help of cutting-edge technology like artificial intelligence (AI) (Hajjar & Tekli, 2022; Dhaini & Mansour, 2021; Xu et al., 2021; Deveci et al., 2022), machine learning (ML) (Tay & Mourad, 2020; Abbas et al., 2021; Gegres et al., 2022; Maroun et al., 2022), and big data (Slim et al., 2021; Wu et al., 2016; Kaur et al., 2021).

Researchers understand the importance of DSS at an early stage; therefore, they try to integrate the concept of DSS in most domains. Due to this, there are many definitions of DSS with respect to its application in the domain.

A number of distinct descriptions and taxonomies of decision support systems have also been pro- posed. Different writers classify them in different ways, some based to the general activities they support and others according to the technical component or driver that is the most important factor in their development. The methodologies, tools, and ideas for decision support, together with the data and players engaged at various organizational levels, are the primary subject of this in-depth examination of the incorporation of strategic sustainability in decision systems (Hallstedt et al., 2010; Prathiba et al., 2021). According to the definition of DSS, its characteristics keep on changing. However, decision- makers should evaluate performance as part of reviewing the sustainability process. This procedure is essential to ensure the sustainability process and to assist decision-makers in improving their operations on an operational, tactical, and strategic level. Some scholars have created a number of instruments us- ing a wide range of models to evaluate the corporate or strategic level of sustainability performance, but they have yet to find a suitable model for assessing operational-level sustainability (Sriyanto et al., 2019; Hadiguna, 2013).

In a world full of unknowns, the DSS, when combined with cutting-edge technology, may make a huge difference for sustainable development. For sustainability goals to be met, value chain networks must effectively communicate and make decisions. DSS is the next step in the evolution of information technology, and it will have a more direct effect than previous approaches. In terms of real-time pro- duction flow monitoring, inventory shortages, cost management of the procurement process through suppliers, and the avoidance of order delays, the DSS may play an important role towards the SDGs agenda. Data-driven decision-making (DSS) is the process of enabling a computer system or network to automatically learn from data patterns. Day-to-day human interaction determines the company's goals and its impact on the world (Modgil et al., 2020; Syam & Sharma, 2018; Bienhaus & Haddud, 2018; Sellak et al., 2017).

Sustainability and other long-term economic problems are naturally decided upon by upper man- agement, although lower layers of the company, such as product development teams, should ideally be aligning their efforts with the strategic direction. Consequently, the relationship between upper-level management and product development, as well as how each influences choices about sustainability, will be further investigated in DSS operations.

Studies of decision-making and decision-support systems draw from many different academic dis- ciplines, including management, computing, psychology, and the philosophy of new product creation. Computer programs or, more specifically, "Interactive computer-based systems that assist decision- makers employ data and models to address unstructured issues" are what most people think of when they hear the word "decision support system."

LITERATURE REVIEW

By combining Fuzzy Preference Programming, a variant of the fuzzy analytical hierarchy process, and the Fuzzy Inference System (FIS), a fuzzy rule-based expert system, the author (Fallahpour et al., 2020) proposed a decision support model to aid managers in grasping the idea of sustainability in construction project selection and selecting the best project using a new integrated multi-criterion decision making approach under uncertainty.Fifteen sustainability characteristics were chosen for

further study in the initial round of the project. The second step included using FPP to determine the ultimate importance of each criterion. At the end of the process, the best project was chosen using the weighted FIS. Project 3 was found to have the greatest overall performance. Finally, the generated model's validity and robustness were checked using two separate evaluation tests. According to the authors (Mavi & Standing, 2018) of, a thorough list of sustainability qualities and sub-attributes is required to help decision makers of construction enterprises grasp the notion of sustainability. The authors (Heravi et al., 2017) stressed the need of giving the process of identifying CI initiatives that would be sustainable greater research and discussion from professionals in the field. One of the needs they identified was the creation of a framework that defines sustainability standards precisely and also includes a decision- making tool. With the help of a case study conducted in Iran, the authors suggested a hybridized fuzzy MCDM technique for assessing building projects in terms of sustainability qualities and choosing the most suitable sustainable project.

Authors (Poplawska et al., 2015) in this research provides a hybrid integrated framework that combines cognitive mapping and analytic networks process (ANP) to define, prioritize, and choose CSR programs for implementation, therefore overcoming constraints of single multiple-criterion decision analysis models. The ANP network and CSR program significance may be established with the use of the strategic cognitive map. Then, the best possible allocation of assets to CSR options is determined using a knapsack optimization technique. Through a case study in the extractive industry, we show how the framework may be put to use. The framework was put through its paces with 61 participants through mail and online surveys, master's degree program seminars, and informal networking at a conference. In this study author's(Sriyanto et al., 2019) overarching objective is to design a decision support system (DSS) for monitoring, assessing, and enhancing current production processes to better meet sustain- ability targets. The DSS has a model for manufacturing sustainability built in that evaluates how well factories are doing in terms of the Triple Bottom Line right now. Indicators covering economic, en- vironmental, and social factors are consolidated into a single index with this approach. These metrics were custom-made for the Indonesian furniture sector. The prototype DSS, known as EvaSus, was built as an interactive tool to provide managers with an in-depth assessment of the manufacturing sector's sustainability and, in turn, a means to enhance their operations. The purpose of this research (Hallstedt et al., 2010) was to provide a methodology for evaluating the degree to which a company's strategic decision system incorporates considerations of environmental, social, and governance (ESG) issues, and to provide broad recommendations for doing so. Authors (Okfalisa et al., 2022) in this research has recently shifted its emphasis to using a dashboard model based on Decision Support Systems (DSS)

in order to gauge the degree of digitalization preparedness among small and medium-sized enterprises (SMEs). The Fuzzy-Analytical Hierarchy Process Method (F-AHP) for the weighting measurement and the Objective Matrix (OMAX) for the performance mapping analysis are both embedded in the development of the Business Intelligent (BI) dashboard and are thus seen as two views of business and Information Technology (IT) dimensions. This article (A. M. Pereira et al., 2022) presents a literature overview on the use of fashion CMs in FRSC decision-making, with the goal of generating potential research topics for further study. Since the fashion industry is still in its infancy, research on the topic is both pertinent and important. Working on the agenda items might be useful for many parties involved in the fashion industry, not just the end consumer, and lead to more informed choices in a wide range of FRSC situations and dynamics.

Limitation of Present Literature

- Lack of empirical evidence: One of the primary research gaps in this field is the lack of empirical evidence to support the claims made in the paper. While the paper provides a theoretical framework for the use of global information management in decision support systems for sustainable development, there is a need for empirical studies to validate this framework.

- Limited focus on the role of data quality: The paper provides a brief discussion of the importance of data quality in decision support systems, but there is a need for further research to investigate how data quality can be ensured in global information management systems used in decision support systems for sustainable development. This research could investigate the different approaches to data quality management and identify best practices.
- Limited attention to the role of stakeholders: The paper briefly mentions the importance of stake- holder involvement in decision-making processes but does not provide a comprehensive discus- sion of this issue. Future research could investigate the role of stakeholders in decision-making processes and identify the factors that contribute to effective stakeholder engagement in decision support systems for sustainable development.
- Limited discussion of the impact of global information management systems on decision-making processes: While the paper discusses the potential benefits of using global information management systems in decision support systems for sustainable development, there is a need for further research to investigate the impact of these systems on decision-making processes. This research could explore how global information management systems can influence decision-making processes and identify the factors that contribute to their effectiveness.
- Limited exploration of the role of decision-making models: The paper provides a brief discussion of the role of decision-making models in decision support systems, but there is a need for further research to investigate the different types of decision-making models that are suitable for use in decision support systems for sustainable development. This research could explore the different types of decision-making models and identify the factors that contribute to their effectiveness in supporting sustainable development.

RESEARCH METHODOLOGY

In this section, we give the details about our research methodology. The impact of global information management on the decision support system is a vast topic and it is very difficult to analyze all the literature related to the topic. We limit our research top the Scopes index papers. As most of the global publications are indexed in the Scopus database, we can say that our research includes all the relevant papers. The details of our selected papers are presented in Figure 1.

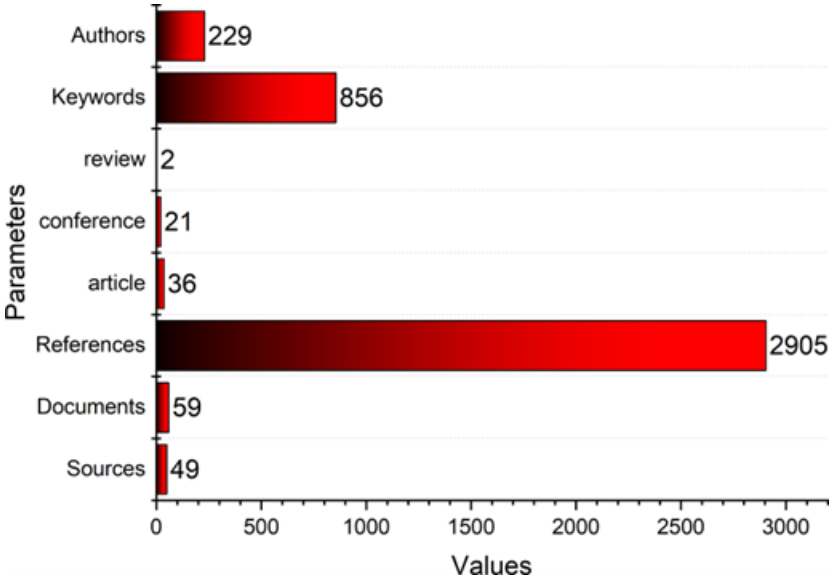
In order to get the information from the Scopus database, we used the following search terms:

- Global information management
- Decision support systems
- Sustainable development

In order to analysis the information from the Scopus database we used the R studio (Racine, 2012). R studio is a python based tool to analysis the database. R Studio is an Integrated Development Environment (IDE) for the R programming language. It provides a user-friendly interface for writing, executing, and debugging R code and data analysis, visualization, and reporting. Here are some key features of R Studio:

- Code Editor: R Studio comes with a powerful code editor that includes syntax highlighting, code completion, and indentation.
- Data Viewer: R Studio has a built-in data viewer that lets you view and edit data frames, matrices, and other data structures.
- Package Manager: R Studio has a package manager that lets you install, update, and manage R packages.

Figure 1. Main Information



- Plots Viewer: R Studio has a built-in plots viewer that lets you view and manipulate plots created with R's graphics system.
- Debugging Tools: R Studio has a debugger that lets you check your code and find errors.
- Markdown Support: R Studio supports Markdown, which lets you create documents that combine text, code, and graphics.
- Shiny Support: R Studio has built-in support for Shiny, a web application framework for R that lets you create interactive web applications.

THEORETICAL AND PRACTICAL IMPLICATIONS

Global information management provides tools and techniques for DSS to achieve the goal of sustainable development. In the business world, AI methods have been utilized to analyze global information management to provide assistance with decision-making duties that are then delegated to automated software. As an example, the business sector relied heavily on artificial intelligence (AI) technology to provide remote high-end customer assistance during the COVID-19 epidemic. Artificial intelligence (AI) methods, such as machine learning algorithms, used for customer modeling have contributed to customizing and improving consumers' experiences. However, recommender systems and other types of DSSs, such as those for allowing advertising tool campaigns, benefit greatly from the personal in- formation gleaned from the plethora of information sources, including massive volumes of client data (A. M. Pereira et al., 2022).

Analysis of Annual production

In this subsection, we give the details of the publication rate of the article on the related research topic. The published articles' statistics are presented in Figure 2a. From the Figure 2a, it is clear that the annual growth rate of paper publication is 10.58%. Therefore, we can say that this research topic is worth investigating.

Important Keywords

In this subsection, we analyze important keywords related to our research topic. Figure 2b presents the important keywords. In Figure 2b the size of keyword presents the frequency of occurrence, as the frequency of occurrence increases the size of keyword increases. Therefore, from Figure 2b it is clear that *decision making* and *DSS* are the most commonly used words in the literature.

Analysis of Most Cited Countries and Institutes

In this subsection, we give details about the ranking of the countries in terms of global citation. The ranking of countries helps to understand the research production of the respective country. If the global rank of the country is higher then it means that large number of researchers in that country are working in the respective field. Figure 2c presents the ranking of the countries. In addition, Figure 2d represents the most important affiliations.

Analysis of Most Cited papers

Table 1 presents the distribution of the ranking of articles according to global citation. This will help the future researchers to get more information about the topics.

Analysis of the Importance of Information Management for DSS

Due to increasing public interest in environmental preservation and social problems, businesses today must take environmental and social concerns as seriously as they do their bottom line. Sustainability refers to a multifaceted notion that takes into account not only the effects on the environment but also on society and the economy. The selection of building projects now often takes into account sustain- ability factors. It's not easy to figure out which sustainable project is the best given a list of criteria. Consequently, it may be very useful for decision makers to build a suitable decision support framework for information management to achieve the anticipated business objectives and timely completion of high-quality projects (Fallahpour et al., 2020).

Corporate social responsibility (CSR) initiatives are crucial to a business's future success, alongside sustainable growth. The process of incorporating CSR into an organization's overarching strategy is intricate. To implement CSR in practice, companies need access to analytical data on their external and internal surroundings to identify opportunities and threats to sustainable integration(Poplawska et al., 2015). Therefore, we can say that global information management plays an important role in achieving sustainability and CSR.

In addition to CSR, some companies consider supply chain management to play an important role in achieving sustainable development (Koh et al., 2013). However, it has been understood that studying the performance of supply chain management at the firm level is not easy.Furthermore, there is no direct relationship between supply chain management and sustainable development. The relation can only be understood and studied with the help of analysis of the present information. Hence, global information management plays an important role in achieving sustainable development.

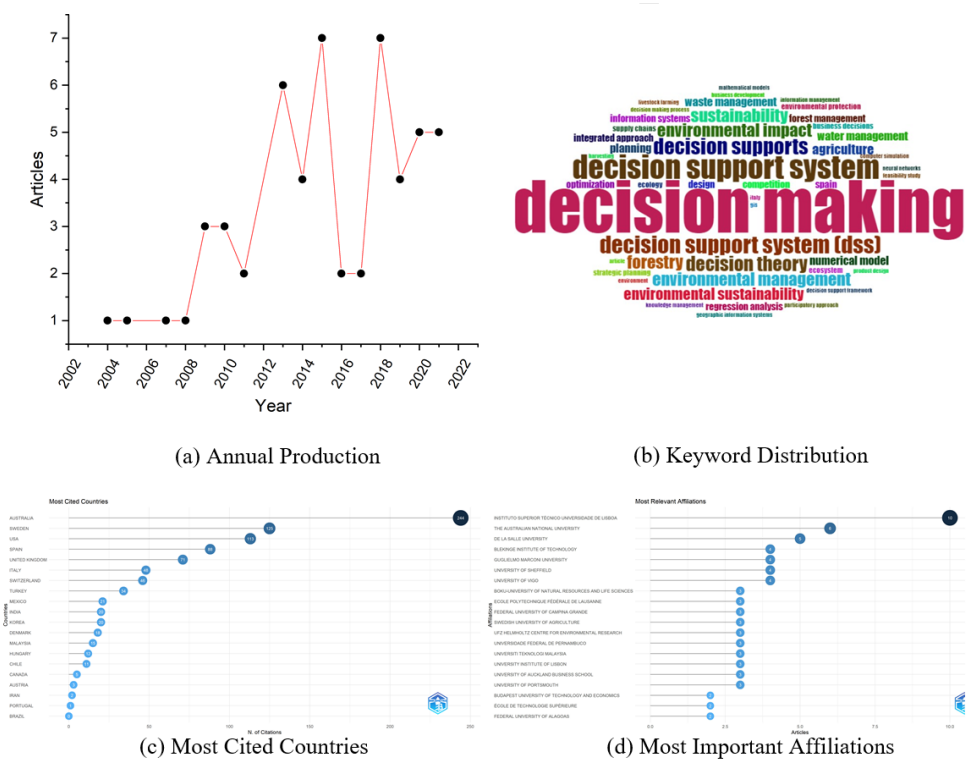
Since this is the case, sustainability evaluation and CSR should take a more comprehensive look at information management techniques. Although it is possible to calculate sustainability performance manually, doing so is time-consuming and often leads to errors. Therefore, sustainability evaluation is performed mainly using the latest artificial intelligence(AI)-based algorithms and tools.

Future Research Directions

In this subsection, we present some potential research directions for global information management in DSS for Sustainable development

- The use of machine learning algorithms: One potential area of research could be the exploration of how machine learning algorithms can be used to extract useful information from

Figure 2. Statistical Results



(a) Annual Production

(b) Keyword Distribution

(c) Most Cited Countries

(d) Most Important Affiliations

global information management systems for use in decision support systems. This could involve investigating the different types of machine learning algorithms suitable for this task and developing new algorithms specifically designed for this purpose.

- Development of a comprehensive framework: Another possible research direction could be the development of a comprehensive framework that outlines the key components required for effective global information management in decision support systems for sustainable development. This could involve investigating the different types of data that need to be collected and how they can be processed and analyzed to provide useful insights for decision makers.
- Evaluation of decision support systems: Future research could also focus on evaluating the effectiveness of decision support systems that use global information management systems for sustainable development. This could involve carrying out case studies and surveys to assess the performance of different systems and identify the factors that contribute to their success or failure.
- The role of data visualization: Finally, another potential research direction could be the explo- ration of how data visualization techniques can be used to improve the effectiveness of decision support systems. This could involve investigating different types of visualization techniques and their impact on decision making and exploring how these techniques can be integrated into decision support systems that use global information management systems for sustainable development.

Overall, these potential research directions could help to advance our understanding of how global information management can be used in decision support systems for sustainable development and identify ways to improve the effectiveness of these systems.

Table 1. Most Cited Papers

Paper	DOI	Total Citations	TC per Year	Normalized TC
MCINTOSH BS, 2011, ENVIRON MODEL SOFTW (McIntosh et al., 2011)	10.1016/j.envsoft.2011.09.009	222	18.5	1.8122
HALLSTEDT S, 2010, J CLEAN PROD (Hallstedt et al., 2010)	10.1016/j.jclepro.2009.12.017	114	8.7692	2.7143
LENNY KOH SC, 2013, INT J PROD RES (Koh et al., 2013)	10.1080/00207543.2012.705042	64	6.4	2.7826
RIERA PÉREZ MG, 2018, SUSTAINABLE CITIES SOC (Pérez et al., 2018)	10.1016/j.scs.2017.12.038	46	9.2	3.9268
CHUNG G, 2009, WA- TER RESOUR MANAGE(Chung & Lansey, 2008)	10.1007/s11269-008-9300-6	46	3.2857	2
MUÑOZ E, 2013, J CLEAN PROD (Muñoz et al., 2013)	10.1016/j.jclepro.2012.11.032	36	3.6	1.5652
ANVARI S, 2017, INT J PROD RES (Anvari & Turkay, 2017)	10.1080/00207543.2017.1341064	34	5.6667	1.2143
CABRERA VE, 2008, CLIM CHANGE (Cabrera et al., 2007)	10.1007/s10584-007-9371-z	25	1.6667	1
MOLINA J-L, 2011, WATER RESOUR MANAGE (Molina et al., 2011)	10.1007/s11269-011-9859-1	23	1.9167	0.1878

Table 2

VIZZARI M, 2013, ENVIRON MANAGE (Vizzari & Modica, 2013)	10.1007/s00267-013-0149-y	23	2.3	1
ACOSTA M, 2017, FORESTS (Acosta & Corral, 2017)	10.3390/f8040116	22	3.6667	0.7857
SHI Y, 2019, J CLEAN PROD (Shi et al., 2019)	10.1016/j.jclepro.2018.11.209	22	5.5	2.2564

continued on following page

Table 2. Continued

VIZZARI M, 2013, ENVIRON MANAGE (Vizzari & Modica, 2013)	10.1007/s00267-013-0149-y	23	2.3	1
SILVA-HIDALGO H, 2009, WATER RESOUR MANAGE (Silva-Hidalgo et al., 2008)	10.1007/s11269-008-9296-y	21	1.5	0.913
MODGIL S, 2020, PROD PLANN CONTROL (Modgil et al., 2020)	10.1080/09537287.2019.1695916	20	6.6667	1.4925
JIN D-H, 2018, SUSTAINABILITY (Jin & Kim, 2018)	10.3390/su10103778	20	4	1.7073
PEREIRA IPC, 2020, J CLEAN PROD (I. P. Pereira et al., 2020)	10.1016/j.jclepro.2020.120154	18	6	1.3433
FALLAHPOUR A, 2020, J CIV ENG MANAGE (Fallahpour et al., 2020)	10.3846/jcem.2020.12183	15	5	1.1194

CONCLUSION

Global information management has enormous potential to enhance and shape DSS for the fulfillment of the SDGs. Global information management techniques will be invaluable for deciphering the large amounts of real-time data gathered and drawing useful conclusions about areas such as resource allocation, consumer preferences, and supply chain efficiency. Future DSS approaches may benefit from the data that are now accessible in many formats and on various platforms, such as social media, the supplier network and the distributor network. In this context, this research analysis the importance of global information management in DSS to achieve sustainable development. In this research, we analyze articles in the Scopus index published between 2004 and 2022 to obtain in-depth information on the importance of global information management for DSS. This research will help the researchers formulate new theories and standards related to DSS to achieve sustainable development.

REFERENCES

Abbas, N., Nasser, Y., Shehab, M., & Sharafeddine, S. (2021). Attack-specific feature selection for anomaly detection in software-defined networks. In *2021 3rd IEEE middle east and north africa communications conference (menacomm)* (pp. 142–146). doi:10.1109/MENACOMM50742.2021.9678279

Acosta, M., & Corral, S. (2017). Multicriteria decision analysis and participatory decision sup- port systems in forest management. *Forests, 8*(4), 116. 10.3390/f8040116

Almomani, A., Alauthman, M., Shatnawi, M. T., Alweshah, M., Alrosan, A., Alomoush, W., & Gupta, B. B. (2022). Phishing website detection with semantic features based on machine learning clas- sifiers: A comparative study. *International Journal on Semantic Web and Information Systems*, *18*(1), 1–24. doi:10.4018/IJSWIS.297032

Anvari, S., & Turkay, M. (2017). The facility location problem from the perspective of triple bottom line accounting of sustainability. *International Journal of Production Research, 55*(21), 6266–6287. 10.1080/00207543.2017.1341064

Bienhaus, F., & Haddud, A. (2018). Procurement 4.0: Factors influencing the digitisation of procure- ment and supply chains. *Business Process Management Journal*, *24*(4), 965–984. doi:10.1108/BPMJ-06-2017-0139

Cabrera, V. E., Breuer, N. E., & Hildebrand, P. E. (2007). Participatory modeling in dairy farm systems: a method for building consensual environmental sustainability using seasonal climate forecasts. *Climatic Change, 89*(3-4), 395–409. doi: 10.1007/s10584-007-9371-z

Chung, G., & Lansey, K. (2008). Application of the shuffled frog leaping algorithm for the optimization of a general large-scale water supply system. *Water Resources Management, 23*(4), 797–823. 10.1007/s11269-008-9300-6

Deveci, M., Pamucar, D., Gokasar, I., Köppen, M., & Gupta, B. B. (2022). Personal mobility in metaverse with autonomous vehicles using q-rung orthopair fuzzy sets based opa-rafsi model. *IEEE Transactions on Intelligent Transportation Systems*.

Dhaini, M., & Mansour, N. (2021). Squirrel search algorithm for portfolio optimization. *Expert Systems with Applications*, *178*, 114968.

Fallahpour, A., Wong, K. Y., Rajoo, S., Olugu, E. U., Nilashi, M., & Turskis, Z. (2020). A fuzzy decision support system for sustainable construction project selection: An integrated FPP-FIS model. *Journal of Civil Engineering and Management, 26*(3), 247–258. .1218310.3846%2Fjcem.2020

Gaurav, A., Gupta, B. B., & Panigrahi, P. K. (2022). A comprehensive survey on machine learning approaches for malware detection in iot-based enterprise information system. *Enterprise Information Systems*, 1–25.

Gegres, F., Azar, D. A., Vybihal, J., & Wang, J. T. (2022). Early prediction of movie success using machine learning and evolutionary computation. In *2022 21st international symposium on communications and information technologies (iscit)* (pp. 177–182). Academic Press.

Ginzarly, M. (2021). Social media data for the conservation of historic urban landscapes: Prospects and challenges. *Lecture Notes in Computer Science, 12795*, 209-223. doi:10.1007/978-3-030-77431-8_13

Hadiguna, R. A. (2013). Decision support system of performance assessment for sustainable supply chain management. *International Journal of Green Computing*, *4*(2), 24–37.

Hajjar, A., & Tekli, J. (2022). Unsupervised extractive text summarization using frequency-based sentence clustering. In *New trends in database and information systems: Adbis 2022 short pa- pers, doctoral consortium and workshops: Doing, k-gals, madeisd, megadata, swodch, turin, italy, september 5–8, 2022, proceedings* (pp. 245–255). Academic Press.

Hallstedt, S., Ny, H., Robèrt, K.-H., & Broman, G. (2010). An approach to assessing sustainability integration in strategic decision systems for product development. *Journal of Cleaner Production, 18*(8), 703–712. .2009.12.01710.1016%2Fj.jclepro

Heravi, G., Fathi, M., & Faeghi, S. (2017). Multi-criteria group decision-making method for optimal selection of sustainable industrial building options focused on petrochemical projects. *Journal of Cleaner Production*, *142*, 2999–3013.

Jin, D.-H., & Kim, H.-J. (2018). Integrated understanding of big data, big data analysis, and business intelligence: A case study of logistics. *Sustainability, 10*(10), 3778. 10.3390%2Fsu10103778

Kaur, M., Singh, D., Kumar, V., Gupta, B. B., & Abd El-Latif, A. A. (2021). Secure and energy efficient-based e-health care framework for green internet of things. *IEEE Transactions on Green Communications and Networking*, *5*(3), 1223–1231.

Koh, S. L., Genovese, A., Acquaye, A. A., Barratt, P., Rana, N., Kuylenstierna, J., & Gibbs, D. (2013). Decarbonising product supply chains: design and development of an integrated evidence-based decision support system – the supply chain environmental analysis tool (SCEnAT). *International Journal of Production Research, 51*(7), 2092–2109. doi: 10.1080/00207543.2012.705042

Maroun, C. B., Daou, G., Hammoud, B., & Hammoud, B. (2022). Machine learning using support vector regression in radar remote sensing for oil-spill thickness estimation. In *2021 18th european radar conference (eurad)* (pp. 221–224). Academic Press.

Mavi, R. K., & Standing, C. (2018). Critical success factors of sustainable project management in construction: A fuzzy dematel-anp approach. *Journal of Cleaner Production*, *194*, 751–765.

McIntosh, B., Ascough, J., Twery, M., Chew, J., Elmahdi, A., Haase, D., . . . Voinov, A. (2011, dec). Environmental decision support systems (EDSS) development – challenges and best practices. *Environmental Modelling &amp Software, 26*(12), 1389–1402. doi: 10.1016/j.envsoft.2011.09.009

Modgil, S., Gupta, S., & Bhushan, B. (2020). Building a living economy through modern information decision support systems and UN sustainable development goals. *Production Planning &amp Control, 31*(11-12), 967–987. .2019.169591610.1080%2F09537287

Molina, J.-L., García-Aróstegui, J. L., Bromley, J., & Benavente, J. (2011). Integrated assessment of the European WFD implementation in extremely overexploited aquifers through participatory modelling. *Water Resources Management, 25*(13), 3343–3370. doi: 10.1007/s11269-011-9859-1

Muñoz, E., Capón-García, E., Laínez, J. M., Espuña, A., & Puigjaner, L. (2013). Considering environmental assessment in an ontological framework for enterprise sustainability. *Journal of Cleaner Production, 47*, 149–164. doi: 10.1016/j.jclepro.2012.11.032

Okfalisa, M., Anggraini, W., Saktioto, & Pranggono, B. (2022). Assessing digital readiness of small medium enterprises: Intelligent dashboard decision support system. *International Journal of Advanced Computer Science and Applications, 13*(4). doi: 10.14569/ijacsa.2022.0130412

Pereira, A. M., Moura, J. A. B., Costa, E. D. B., Vieira, T., Landim, A. R., Bazaki, E., & Wanick, V. (2022). Customer models for artificial intelligence-based decision support in fashion online retail supply chains. *Decision Support Systems, 158*, 113795. doi: 10.1016/j.dss.2022.113795

Pereira, I. P., Ferreira, F. A., Pereira, L. F., Govindan, K., Meidute-Kavaliauskiene˙, I., & Correia, R. J. (2020). A fuzzy cognitive mapping-system dynamics approach to energy-change impacts on the sustainability of small and medium-sized enterprises. *Journal of Cleaner Production, 256*, 120154. doi: 10.1016/j.jclepro.2020.120154

Pérez, M. G. R., Laprise, M., & Rey, E. (2018). Fostering sustainable urban renewal at the neighborhood scale with a spatial decision support system. *Sustainable Cities and Society, 38*, 440–451. 10.1016%2Fj.scs.2017.12.038

Poplawska, J., Labib, A., & Reed, D. M. (2015). A hybrid multiple-criteria decision analysis framework for corporate social responsibility implementation applied to an extractive industry case study. *Journal of the Operational Research Society, 66*(9), 1491–1505. 10.1057%2Fjors.2014.116

Prathiba, S. B., Raja, G., Bashir, A. K., AlZubi, A. A., & Gupta, B. (2021). Sdn-assisted safety message dissemination framework for vehicular critical energy infrastructure. *IEEE Transactions on Industrial Informatics*, *18*(5), 3510–3518.

Racine, J. S. (2012). *Rstudio: A platform-independent ide for r and sweave*. JSTOR.

Ren, P., Xiao, Y., Chang, X., Huang, P.-Y., Li, Z., Gupta, B. B., & Wang, X. et al. (2021). A survey of deep active learning. *ACM Computing Surveys*, *54*(9), 1–40.

Sarkissian, S., & Tekli, J. (2021). *Unsupervised topical organization of documents using corpus-based text analysis*. Association for Computing Machinery. doi:10.1145/3444757.3485078

Sellak, H., Ouhbi, B., Frikh, B., & Palomares, I. (2017). Towards next-generation energy planning decision-making: An expert-based framework for intelligent decision support. *Renewable & Sustainable Energy Reviews*, *80*, 1544–1577.

Shi, Y., Arthanari, T., Liu, X., & Yang, B. (2019). Sustainable transportation management: Integrated modeling and support. *Journal of Cleaner Production, 212*, 1381–1395. 10.1016%2Fj.jclepro.2018.11.209

Silva-Hidalgo, H., Martín-Domínguez, I. R., Alarcón-Herrera, M. T., & Granados-Olivas, A. (2008). Mathematical modelling for the integrated management of water resources in hydrological basins. *Water Resources Management, 23*(4), 721–730. doi: 10.1007/s11269-008-9296-y

Slim, A., Al Yusuf, H., Abbas, N., Abdallah, C. T., Heileman, G. L., & Slim, A. (2021). A markov decision processes modeling for curricular analytics. In *2021 20th IEEE international conference on machine learning and applications (icmla)* (pp. 415–421). IEEE.

Sriyanto, P. D., & Hartini, S. (2019). A prototype decision support system for sustainabil- ity performance measurement in furniture industry. *IOP Conference Series: Materials Science and Engineering, 598*(1), 012094. doi: 10.1088/1757-899x/598/1/012094

Syam, N., & Sharma, A. (2018). Waiting for a sales renaissance in the fourth industrial revolution: Machine learning and artificial intelligence in sales research and practice. *Industrial Marketing Management*, *69*, 135–146.

Tay, B., & Mourad, A. (2020). Intelligent performance-aware adaptation of control policies for opti- mizing banking teller process using machine learning. *IEEE Access: Practical Innovations, Open Solutions*, *8*, 153403–153412.

Vizzari, M., & Modica, G. (2013). Environmental effectiveness of swine sewage management: A multicriteria AHP-based model for a reliable quick assessment. *Environmental Management, 52*(4), 1023–1039. 10.1007%2Fs00267-013-0149-y

Wu, J., Guo, S., Huang, H., Liu, W., & Xiang, Y. (2018). Information and communications technologies for sustainable development goals: State-of-the-art, needs and perspectives. *IEEE Communications Surveys and Tutorials*, *20*(3), 2389–2406.

Wu, J., Guo, S., Li, J., & Zeng, D. (2016). Big data meet green challenges: Big data toward green applications. *IEEE Systems Journal*, *10*(3), 888–900.

Xu, M., Peng, J., Gupta, B., Kang, J., Xiong, Z., Li, Z., & Abd El-Latif, A. A. (2021). Multiagent fed- erated reinforcement learning for secure incentive mechanism in intelligent cyber–physical systems. *IEEE Internet of Things Journal*, *9*(22), 22095–22108.

Zhou, H., Noble, C., & Cotter, J. (2015, dec). A big data based intelligent decision support system for sustainable regional development. In *2015 IEEE international conference on smart city/SocialCom/SustainCom (SmartCity).* IEEE. doi: 10.1109/smartcity.2015.169

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