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SUSTAINABLE SUPPLIER EVALUATION: FROM A THEORETICAL CONCEPT TO A STRATEGIC AND OPERATIONAL ASSET IN SUSTAINABLE SUPPLY CHAIN MANAGEMENT

Održiva evaluacija dobavljača – od teorijskog koncepta do strateškog i operativnog instrumenta u održivom upravljanju lancem snabdevanja

Abstract

The topic of sustainable supplier evaluation has gained a significant research momentum in the last couple of years. This is evident from the number of papers and studies published recently. The purpose of this paper is to provide a comprehensive insight into contemporary theoretical approaches to sustainable supplier governance, as well as to determine the extent of theoretical uniformity and practical applicability of existing knowledge. Firstly, a literature review on supplier evaluation is provided, considering relevant articles from the field. After theoretically differentiating traditional from sustainable supplier evaluation, the paper identifies 4 areas of sustainability in contemporary literature and offers an analysis of existing supplier evaluation criteria from a performance and organizational perspective. In this sense, the lack of theoretical uniformity and interindustrial applicability of existing sustainable supplier evaluation approaches in modern business governance has been confirmed. Both professionals and academics could benefit from derived findings in terms of focusing future research efforts and avoiding the dangers of sustainability myopia.

Keywords: *sustainable supplier evaluation, sustainable supply chain management, sustainability myopia.*

Sažetak

Oblast održive evaluacije dobavljača je poslednjih godina dobila na značaju, naročito u pogledu naučno-istraživačkog momentuma. Ovo je evidentno iz broja nedavno objavljenih radova i studija. Svrha ovog rada jeste da obezbedi sveobuhvatni uvid u savremene teorijske pristupe održivoj evaluaciji dobavljača, kao i da odredi obim teorijske uniformnosti i praktične primenljivosti postojećeg znanja. Prvo, daje se pregled literature o održivoj evaluaciji dobavljača, razmatrajući relevantne radove iz oblasti. Nakon teorijske diferencijacije tradicionalne od održive evaluacije dobavljača, u radu se identifikuju 4 područja održivosti u savremenoj literaturi i nudi se analiza postojećih kriterijuma evaluacije iz organizacione i učinkovne perspektive. U ovom kontekstu, potvrđen je nedostatak teorijske ujednačenosti i inter-industrijske primenljivosti postojećih održivih pristupa evaluaciji dobavljača u modernom poslovnom upravljanju. Stručnjaci i akademici bi podjednako mogli imati koristi od izvedenih nalaza u smislu fokusiranja budućih istraživačkih napora, kao i izbegavanja opasnosti održive kratkovidosti.

Gljučne reči: *održiva evaluacija dobavljača, održivo upravljanje lancem snabdevanja, održiva kratkovidost.*

Introduction

Complex political, social, economic, technological, legislative, and environmental challenges colored with risks and uncertainty have brought on a significant increase in business complexity and market volatility, which have forced modern companies to turn to establishing new and intensifying existing contacts and connections with market stakeholders, rather than to face these challenges individually [9], [25], [59]. Importance, prudence, and strength of these newly formed strategic networks lies in creating the value for the final consumer and ensuring his total satisfaction [28] through well-planned stakeholder communication, cooperation and collaboration [8]. Suppliers have a significant role in contributing to company's capability and potential to deliver value to its customers [45], [48]. Therefore, strategic and operational tendencies to improve overall business performance through careful supplier selection, evaluation, management and control have become common corporate occupation.

In order to address complex issues of controlling the flows and functions within distribution channels, companies have developed their own governing and managerial techniques, embodied in the supply chain management (SCM) process. For a company to successfully understand and manage its supply chain, data on suppliers' performances have to be adequately and comprehensively monitored, evaluated, interpreted and acted upon. Part of the supply chain management process tasked with assessing suppliers' performances is identified as supplier evaluation (SE) [30].

We are witnesses of a growing complexity and volatility of modern supply chains, permeated with intertwining ethical, environmental, and social challenges, conjoined as sustainability issues. This has been the driving force for establishing supply chain management practices which incorporate sustainable managerial aspect embodied in the triple bottom line (TBL) principle [26]. Lasting implication has been the shift from supply chain management to sustainable supply chain management (SSCM), and consequently supplier evaluation process to sustainable supplier evaluation (SSE) process, which is aimed at evaluating suppliers within all three domains of

their business responsibility: economic, environmental, and social.

This paper was inspired by strategic and operational potential of SSE within modern SSCM practice and was driven by observed inconsistencies in theoretical considerations and research approaches to this topic. The goal of this research is to provide a comprehensive insight into contemporary approaches to SSE, and analyze the overlook concerning strategic and operational SSE significance in SSCM context. To adequately achieve this objective, the paper was written following a defined pair of research questions:

RQ1: How can SSE be theoretically located?

This research question is aimed at understanding the position of SSE in the contemporary scientific literature, mainly differentiating SSE from SE and understanding intracategorical differences in SSE approaches. This implies delayering various partially sustainable supplier evaluation models, such as green, socio-economic and socio-environmental SSE models from the complete, comprehensive and "true" SSE models, which provide undivided consideration to all three sustainability dimensions [56], [67].

RQ2: How do contemporary SSE approaches overcome modern scientific and practical challenges in SSCM context?

This research question is aimed at determining how contemporary SSE approaches respond to challenges facing modern corporate governance techniques. These challenges imply theoretical uniformity and practical applicability. Theoretical uniformity means that the analyzed approach must respect scientific principles and that multiple iterative methodological applications do not compromise theoretical basis and research scope. Practical applicability denotes the overall "value" and contribution of the SSE model [60]. This is predominantly determined by the interindustrial applicability potential and model's soundness in terms of a wider corporate acceptance [22], [67].

Literature review method is systematically and precisely defined in the following section. Research efforts aimed at understanding the evolution and the overall process of supplier evaluation in the context of sustainability are described in the second section. Findings related to theoretical uniformity and practical

applicability of contemporary SSE approaches are explained in the third section. Thoughts on future applications and development directions of SSE as a part of the overall SSCM process are presented in the discussion part. Concluding remarks and research limitations are provided at the end of this paper.

Research methodology

Theoretical foundation of this paper was determined through a thorough literature review process. Research tendencies were primarily focused on providing a profound insight into the current state of knowledge regarding SE and developing answers to listed research questions through a systematic analysis of data from secondary sources. The main success determinant of any literature review process is to provide clear, specific and topic-related research boundaries [56], [67]. With respect to this, following limitations were imposed on the material collection process:

- (1) Only peer-reviewed publications in scientific journals and conference proceedings written in English were reviewed;
- (2) Both original and review articles with a clear orientation on analyzing supplier performances or explaining supplier evaluation process were reviewed;
- (3) Analyzed articles had to possess both wider supply chain management context and a strong corporate governance context with potential practical implications, as well as a comprehensive theoretical background of SE topic;
- (4) Only papers published between 2002 and 2019 were analyzed.

Material collection is a lengthy, complex process which requires contextual analytical skills and multiple angles in research approach. In order to systematically approach the research topic, a research approach, combining a keyword-based analysis of electronic databases, an analysis of topic-related contemporary literature reviews, thematic research in specific, topic-oriented journals, as well as cross-referencing was implemented [67].

The main research effort was focused on keyword-based analysis of the following electronic databases:

Springer, ScienceDirect, Wiley Online Library, Emerald Insight, IEEE Xplore Digital Library, MIT Press Journals, Public Library of Science, Oxford Academic Journals, and Google Scholar. All used search words were divided into four main keyword groups, according to the thesis research topic. The first group contained terms “sustainable”, “green”, “social”, “environmental”, and “ecological”. The second group contained terms “supplier”, “vendor”, “supply-chain”, and “procurement partner”. The third group contained terms “evaluation”, “selection”, “performance”, “measurement”, “ranking” and “assessment”. The fourth group contained terms “model”, “approach”, “decision making”, “modelling technique” and “framework”. It is important to note that various search word combinations were used, and that terms from all four categories were not always used simultaneously. Using this approach, 42 relevant publications were identified, 7 of which were review papers. Through the analysis of the references of these papers, material pool was expanded by additional 9 papers, amounting to the total of 51 scientific papers, which were then categorized and analyzed.

Chosen literature categorization methods were formulated in a manner which provides a directional, clear answer to aforementioned research questions. Consequently, the following literature categorization was performed in two phases. The first phase provides an insight into the transition from SE to SSE. The second phase explains specific intracategorical differentiation of contemporary SSE approaches in the context of theoretical uniformity and practical applicability.

Transition from traditional to sustainable supplier evaluation

First literature categorization phase is aimed at determining whether there are any differences between SE and SSE. The focus in this stage was to determine the research scope of the analyzed publications, focusing on the industries from which the data were gathered and determining whether the publications are related to SE or SSE processes, as well as which of the three sustainability dimensions [26] were taken into account. The results of this phase are shown in Table 1.

Table 1: Depiction of analyzed publications, with regards to their research nature, methodological application, research scope, and sustainability dimension coverage

| Author(s) (publication year) | Nature | Research scope | Dimensions | | |
|------------------------------------|--------|---------------------------------------|------------|---------------|--------|
| | | | Economic | Environmental | Social |
| Akamp and Müller (2013) | SSE | Multi-industrial | * | * | * |
| Akman (2015) | SSE | Automotive industry | * | * | |
| Amin and Razmi (2009) | SE | Digital service industry | * | | |
| Azadegan (2011) | SE | Multi-industrial | * | | |
| Azadnia et al. (2012) | SSE | Automotive industry | * | * | * |
| Banaeian et al. (2015) | SSE | Food industry | * | * | |
| Bilişik et al. (2012) | SE | Multi-industrial | * | | |
| Boutkhoul et al. (2016) | SSE | Chemical industry | * | * | |
| Brandenburg and Rebs (2015) | SSE | Multi-industrial | * | * | * |
| Bruno et al. (2013) | SE | Railway system manufacturing industry | * | | |
| Carter (2005) | SSE | Multi-industrial | * | * | * |
| Carter and Liane Easton (2011) | SSE | Multi-industrial | * | * | * |
| Carter and Rogers (2008) | SSE | Multi-industrial | * | * | * |
| Chan and Chan (2010) | SSE | Fashion industry | * | * | |
| Chung et al. (2016) | SSE | Bicycle manufacturing industry | * | * | |
| Cormican and Cunningham (2007) | SE | Power supply production and services | * | | |
| De Felice et al. (2015) | SE | Multi-industrial | * | | |
| Diba and Xie (2019) | SSE | Dairy-products industry | * | * | * |
| Ghadimi et al. (2019) | SSE | Electronics industry | * | * | * |
| Gimenez and Sierra (2013) | SSE | Multi-industrial | * | * | |
| Govindan et al. (2016) | SSE | Food industry | * | * | |
| Govindan et al. (2015) | SSE | Multi-industrial | * | * | |
| Grimm et al. (2014) | SSE | Food industry | * | * | * |
| Ho and Nguyen (2007) | SE | Construction industry | * | | |
| Jain and Singh (2014) | SE | Metal processing industry | * | | |
| Kannan et al. (2014) | SSE | Electronics industry | | * | |
| Karsak and Dursun (2014) | SE | Healthcare industry | * | | |
| Khan et al. (2018) | SSE | Automotive industry | * | * | * |
| Kusi-Sarpong et al. (2016) | SSE | Mining industry | * | * | |
| Laosirihongthong et al. (2019) | SSE | Cement manufacturing industry | * | * | * |
| Lima-Junior and Carpinetti (2016a) | SE | Automotive industry | * | | |
| Lima-Junior and Carpinetti (2016b) | SE | Automotive industry | * | | |
| Luthra et al. (2017) | SSE | Automotive industry | * | * | * |
| Morali and Searcy (2013) | SSE | Multi-industrial | * | * | * |
| Pi and Low (2006) | SE | Multi-industrial | * | | |
| Prahinski and Benton (2004) | SE | Automotive industry | * | | |
| Qin et al. (2017) | SSE | Multi-industrial | | * | |
| Rajesh and Malliga (2013) | SE | Metal processing industry | * | | |
| Secundo et al. (2017) | SE | Aerospace industry | * | | |
| Sen et al. (2018) | SSE | Single industry (not disclosed) | * | * | * |
| Seuring and Müller (2008) | SSE | Multi-industrial | * | * | * |
| Shih et al. (2009) | SE | Computer auditing industry | * | | |
| Simpson et al. (2002) | SE | Multi-industrial | * | | |
| Sundtoft Hald and Ellegaard (2011) | SSE | Electronics industry | * | * | |
| Wang Chen et al. (2016) | SSE | Luminance enhancement film industry | * | * | |
| Winter and Lasch (2016) | SSE | Fashion industry | | * | * |
| Xu et al. (2013) | SSE | Multi-industrial | | * | * |
| Yazdani et al. (2017) | SSE | Dairy-products industry | * | * | |
| Yu et al. (2018) | SSE | Home appliances industry | * | * | * |
| Žak (2015) | SE | Multi-industrial | * | | |
| Zimmer et al. (2016) | SSE | Multi-industrial | * | * | * |

Supplier evaluation has been present in a certain intuitive, rudimentary form throughout the centuries. The origins of the first systematic theoretical conceptualization of SE topic can be traced to the 1960s to the works of Dickson and Weber, who referred to the overall process as vendor selection and evaluation (cited in [23]). Since then the topic has gained in scientific momentum and the number of scientific papers written has grown exponentially, following the advances and evolution of prevailing contemporary management and marketing paradigms. In the 1990s this field experienced a notable shift towards acknowledgement of the importance of supplier flexibility, whereas nowadays product and service quality hold supreme position [19] using total customer satisfaction as a guiding strategic beacon. In the last 20 years predominant focus of research efforts has been on establishing a supplier evaluation model with multiple assessment criteria which could be implemented in a specific business environment setting [3], [4], [6], [14], [21], [23], [35], [37], [42], [43], [49], [51], [54], [57]. Only a few SE publications offer a broad industrial research focus [10], [47], [58], [66]. Literature review pointed out some significant shortcomings of the analyzed SE approaches. Firstly, predominant assessment criteria are almost exclusively related to delivery, flexibility, reliability, quality and costs [19], [57]. Secondly, these approaches either neglect or unduly oversimplify the role of sustainability in SCM, and consequently, SE [17]. Lastly, without a sound theoretical uniformity, which intertwines sustainability principles within all the domains of SE general interindustrial applicability of derived solutions cannot be achieved.

In the wake of intensified ecological and social challenges related to micro and macro corporate environments, companies have realized the necessity of integrating sustainability into their SCM practices in order to attain and sustain their competitiveness [13]. Thus, in recent years SSCM has gained in importance [25] and, consequently, companies are now shifting towards SSE trying to ensure that their corporate sustainability goals are understood and met throughout their entire supply chain [17].

Although both SE and SSE approaches are based on the same guiding principle of improving corporate performances using careful supplier evaluation and

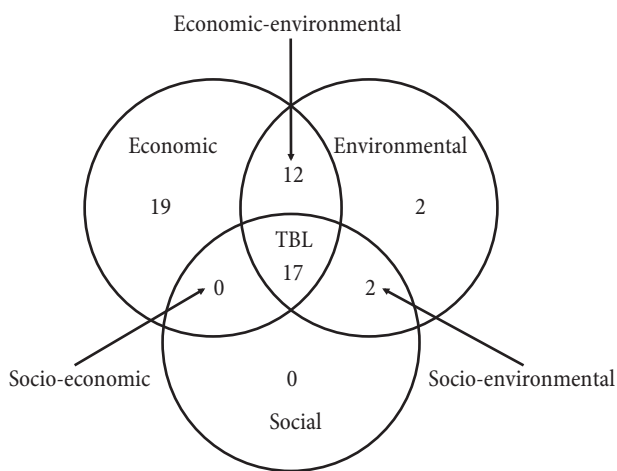
selection, theoretical and practical implications differ greatly. The most significant difference is that SE is based purely on traditional economic theory, focusing solely on economic aspect of supplier performances, whereas SSE is constructed around the notion of introducing TBL principles to corporate governance through sustainable analysis of supplier overall performances [59] decision makers value improvements in supplier cost savings and injury reduction equally, which was somewhat unexpected. Further, both improvements in supplier cost savings and injury reduction were valued over supplier emissions performance. Because we measure individual tradeoff preferences, multi-level regression analysis was used to better understand the impact of respondent value structure regarding sustainably developing suppliers. Our findings suggest a hierarchy of tradeoff preferences for decision makers as they pertain to sustainable supplier development. As the pressure to ensure supply chain sustainability increases, more firms will engage in sustainable supplier development. The outcomes of the choices they make when choosing between initiatives, and how managers make these choices, will be of increasing interest in both industry and academia. This research answers previous calls for further examination of decision maker tradeoff preferences in sustainable supply chain development.”,”container-title”:”Journal of Purchasing and Supply Management”,”DOI”:”10.1016/j.pursup.2019.100574”,”ISSN”:”14784092”,”issue”:”5”,”journalAbbreviation”:”Journal of Purchasing and Supply Management”,”language”:”en”,”page”:”100574”,”source”:”DOI.org (Crossref). Therefore, when determining whether any significant differences exist between SE and SSE processes, the following proposition can be derived:

P1: There are significant differences between SE and SSE processes.

It is important to note that within the broad category of SSE, significant variations exist, mainly related to the selectiveness in the choice of supplier assessment criteria. Analyzed papers were categorized according to their sustainability dimensions’ orientation, as shown in the last three columns in Table 1, and graphically presented in Figure 1. This resulted in the identification of three partially sustainable SSE approaches: economic-environmental, socio-environmental and socio-economic, alongside the

approach based on TBL sustainability. These areas can be seen in Figure 1, as areas where two or more circles representing three sustainability dimensions overlap.

Figure 1: Distribution of the coverage of economic, environmental and social dimensions of analyzed articles (adapted from Brandenburg and Rebs (2015))



From Table 2, it can be seen that literature dedicated to SSE is abundant and provides a wide diapason of insights into the manners in which sustainability could be incorporated into main supplier evaluation activities. Nevertheless, contemporary literature is often single-directional, focusing on the specific aspect of sustainability, neglecting the interdimensional relations, synergetic interactions and economic soundness of the other remaining aspects [13], [16], [17], [56].

Table 2: Categorization of SSE publications, according to their sustainability dimensions' coverage

| Sustainability category | Number of papers |
|--------------------------------|------------------|
| Triple bottom line (TBL) | 17 (54.8%) |
| Economic-environmental (Green) | 12 (38.7%) |
| Socio-economic | 0 (0.0%) |
| Socio-environmental (CSR) | 2 (6.4%) |
| Total | 31 (100.0%) |

Economic-environmental approach to sustainability

In the performed literature analysis 38.7% of all analyzed SSE papers focused on the economic and environmental component of sustainability, often referred to as green supplier evaluation models [2], [6], [11], [19], [20], [30], [31], [32], [40], [60], [61], [64]. These models focus on evaluating the environmental aspects of supplier activities, but in

doing so neglect or underestimate social dimension, whilst often proposing measures and changes which are without strategic connotation and not economically justified in modern supply chain management, and thus not acceptable for the majority of companies [56]. Similar problem occurs when only environmental aspect is taken into account [36], [50], also leading to a certain sustainability myopia.

Socio-environmental approach to sustainability

In contemporary supply chain management practices, environmental and social business aspects are often, at best, subordinated compared to economic considerations. This kind of business conduct brought about significant, often global, environmental and social concerns, issues and conflicts. Legislation in modern countries, like those of EU-28, is slowly moving towards raising requirements for certain companies regarding non-financial reporting. This initiative is aimed at introducing corporate social responsibility (CSR) in modern business and strategic management. In this context, two out of all analyzed SSE articles (6.4%) focused on evaluating environmental and social performances of suppliers in the procurement phase of sustainable supply chain management process [62], [63]. These approaches, although with a clear research focus based on CSR philosophy, still lack the necessary economic focus essential for providing the “catchy” appeal to supply chain managers [56].

Socio-economic approach to sustainability

The approach focused on analyzing combined social and economic supplier performances is not a common occurrence in contemporary SSE researches. None of the analyzed papers implemented this approach. This can be explained by the fact that social considerations still represent a subordinated focus, compared to two other remaining sustainability dimensions. Although not present in this study, socio-economic supplier evaluation can be appealing for companies with strong and lasting ties to the local communities, often operating in transitional economies. As an example, many large corporate entities from former Socialist Federative Republic of Yugoslavia still

persevere until this day, and in the context of transitional adaptation to modern business environment, supply chain procurement management which focuses on economic supplier performances, but with a notable localized societal secondary orientation. One of potential explanations for the apparent lack of environmental assessment dimension could be the lack of financial means and legislative pressure in developing countries. Furthermore, national market specificities [46], a relatively short period of scientific consideration of social criteria, as well as quantification efforts encountered by researchers [67].

Triple bottom line approach to sustainability

The only strategically acceptable, long-term orientated supplier evaluation phase of the supply chain management is the one acknowledging all three dimensions of sustainability equally. From the managerial perspective this kind of comprehensive sustainability coverage ensures the fulfilment of economic requirements, alongside adequate assessment of, control, guiding and solving emerging environmental and social issues, with both short-term procurement and long-term strategic implications on the entire SCM process ensuring the avoidance of sustainability myopia. In the conducted literature review the largest portion of analyzed SSE publications (54.8%) adhered to the triple bottom line sustainability principle, by covering economic, environmental and social aspect of supplier assessment process. Although the majority of these papers focus on a particular set of industry-specific challenges,

the approaches developed provide a clear illustration of how a comprehensive sustainability philosophy can be directly implemented in solving a practical managerial problem. It is important to note that TBL philosophy is slowly gaining an implementational advantage compared to other approaches, especially in the last few years [24], [29], [38], [41], [55], [65]. Another denoting characteristic of modern TBL SSE papers is that they evolve and grow in terms of research complexity and comprehensiveness, through ever increasing number of evaluation criteria and its hierarchical levels.

Theoretical and practical differentiation of contemporary sustainable supplier evaluation approaches

In order to identify the differences between analyzed SSE approaches, a deeper understanding of their research focuses and used supplier evaluation criteria (research comprehensiveness) is needed. The research focus of an SSE approach denotes the perspective of the process determining whether the context is operational or strategic. On the other hand, research comprehensiveness shows whether the scope of the evaluation covers only specific supplier activities or a wider array of supply chain activities. Implemented supplier evaluation criteria are closely related to the aforementioned research focus and represent a practical manifestation of theoretical background, sustainability considerations and research scope. Summarized findings in this respect are presented in Table 3.

Table 3: Summary of SSE publications, with regards to their sustainability category, research focus and used supplier evaluation criteria

| Author(s) (publication year) | Category | Research focus | Criteria |
|------------------------------|----------|---|--|
| 1. Akamp and Müller (2013) | TBL | Supplier evaluation, selection, monitoring and development process in developing countries. | (1) Environmental criteria compliance (2) Social criteria compliance (3) Suppliers' factory inspection (4) Political stability of supplier's country of operations (5) Transport connections |
| 2. Akman (2015) | Green | Development of a green supplier evaluation model, with a case study of automobile industry | (1) Delivery (2) Quality (3) Cost (4) Service (5) Green design (6) Pollution prevention (7) Green image (8) Green capability (9) Environm. management system |

| Author(s) (publication year) | Category | Research focus | Criteria |
|-----------------------------------|----------|--|---|
| 3. Azadnia et al. (2012) | TBL | Theoretical and practical development of a new methodological approach to supplier evaluation (FAST) | (1) Cost (2) Quality (3) Delivery (4) Health and safety (5) Stakeholder rights (6) Pollution (7) Eco-friendly product design (8) Environm. management system |
| 4. Banaeian et al. (2015) | Green | Comparison of three main MCDM techniques for supplier evaluation and selection in food industry sector | (1) Qualitative (2) Financial (3) Management and organization (4) Services (5) Production technology (6) Environm. management system (7) Green image (8) Design for environment (9) Environmental improvement costs (10) Green competencies |
| 5. Boutkhoul et al. (2016) | Green | Establishing a green supply chain management in chemical industry, based on sustainable supplier evaluation | (1) Productivity (2) Costs of material purchasing and energy consumption (3) Firm's competitiveness (4) Profitability (5) Human resources (6) Technological infrastructure and technical expertise (7) Organizational structure (8) Environmental quality of products/processes (9) Emissions and waste (10) Use of harmful/hazardous materials/components |
| 6. Brandenburg and Rebs (2015) | TBL | In-depth literature review of sustainable supplier evaluation practices, and provision of guidelines for conducting SSE | None |
| 7. Carter (2005) | TBL | Implementation of CSR practices into supply chain management, and linking suppliers' extended performance monitoring with overall corporate success | (1) Quality (2) Efficiency (3) Lead time (4) Diversity (5) Environment (6) Human Rights (7) Philanthropy (8) Safety |
| 8. Carter and Liane Easton (2011) | TBL | Systematic literature analysis regarding sustainability implementation and potency in supplier evaluation process | None |
| 9. Carter and Rogers (2008) | TBL | Large-scale literature review to introduce the concept of sustainability to the field of supply chain management, and demonstrate the relationships among environmental, social, and economic performance within a supplier evaluation and selection process | None |
| 10. Chan and Chan (2010) | Green | Supplier evaluation modelling in fashion industry, using AHP methodology | (1) Delivery (2) Quality (3) Assurance of supply (4) Flexibility (5) Cost (6) Organizational strategic issues and reliability (7) Perceived risks (8) Technological issues (9) Environmental issues |
| 11. Chung et al. (2016) | Green | Combined methodological approach to determining green supplier evaluation approach | (1) Operation management (2) Production management (3) Customer management (4) Green management |

| Author(s) (publication year) | Category | Research focus | Criteria |
|--------------------------------|----------|--|---|
| 12. Diba and Xie (2019) | TBL | Development of a specialized sustainable supplier evaluation model using grey relational analysis | (1) Cost (2) Logistics and quantity (3) Technology (4) Environm. management system (5) Standard quality (6) Management commitment |
| 13. Ghadimi et al. (2019) | TBL | Implementation of multi-agent system in a fuzzy inference model for sustainable supplier evaluation | (1) Green image (2) Pollution control (3) Green competences (4) Quality (5) Service/Delivery (6) Cost (7) Technical capability |
| 14. Gimenez and Sierra (2013) | Green | Establishing the link between environmental suppliers' performances, and its impact on the overall performance | (1) Supplier assessment (2) Collaboration with suppliers (3) Environmental performance |
| 15. Govindan et al. (2016) | Green | Implementation of PROMETHEE method on supplier evaluation process in food industry sector | (1) Cost (2) Quality (3) Delivery (4) Environmental impacts (5) Technology capability |
| 16. Govindan et al (2015) | Green | Overview of MCDM techniques, and their applicability in green supplier evaluation models | None |
| 17. Grimm et al. (2014) | TBL | Development and implementation of a broad, sustainable supplier evaluation approach in food industry | (1) Trust (2) Buyer-power (3) Committed long-term relationship (4) Supply-know-how (5) Willingness to disclose suppliers (6) Involvement of suppliers (7) Perceived value for suppliers (8) Risk of supplier-by-passing (9) Suppliers' capability to comply with sustainability standards (10) Geographical distance (11) Cultural distance |
| 18. Khan et al. (2018) | TBL | Proposition of supplier performance evaluation framework based on fuzzy-Shannon Entropy model | (1) Cost (2) Quality (3) Delivery (4) Service reliability (5) Flexibility (6) Financial capability (7) Emission (8) Resource consumption (9) Environm. management system (10) Environment friendly materials (11) Cleaner technology (12) Recycled material (13) Employment practice (14) Health and safety (15) Employer rights (16) Information disclosure (17) Social commitment |
| 19. Kusi-Sarpong et al. (2016) | Green | Development of green supplier evaluation method adapted to ANP and DEMATEL methodologies | (1) Green information technology and systems (2) Strategic supplier partnership (3) Operations and logistics integration (4) Internal environmental management (5) Eco-innovation practices (6) End-of-life practices |

| Author(s) (publication year) | Category | Research focus | Criteria |
|------------------------------------|----------|---|---|
| 20. Laosirihongthong et al. (2019) | TBL | Introduction of a holistic FAHP framework for sustainable supplier evaluation and purchasing order allocation | <ol style="list-style-type: none"> (1) Quality (2) Price (3) Delivery (4) Production facilities and capacity (5) Financial situation (6) Pollution controls (7) Pollution prevention (8) Environm. management system (9) Energy consumption (10) Employment practices (11) Health and safety |
| 21. Luthra et al. (2017) | TBL | Providing a triple bottom line supplier evaluation model, based on combined AHP - VIKOR methodology | <ol style="list-style-type: none"> (1) Price of product (2) Profit on product (3) Quality of product (4) Flexibility (5) Technological and financial capability (6) Production facilities and capacity (7) Delivery and service (8) Lead time required (9) Transportation cost (10) Environm. management system (11) Green design (12) Green manufacturing (13) Green packaging and labelling (14) Waste management (15) Environmental costs (16) Environmental competencies (17) Green R&D and innovation (18) Health and safety (19) Employee rights and interests (20) Stakeholder rights (21) Information disclosure |
| 22. Morali and Searcy (2013) | TBL | Review of sustainability practices in supplier evaluation in Canadian companies | None |
| 23. Sen et al. (2018) | TBL | Complex MCDM sustainable supplier evaluation using methodological hybrid combination | <ol style="list-style-type: none"> (1) Price (2) On time delivery (3) Service and relationship (4) Flexibility (5) Quality (6) Financial capability (7) Production facilities (8) Organization (9) Stakeholder rights (10) Work safety (11) Information disclosure (12) Respect for policy (13) Recycling (14) Waste equipment (15) Ozone depleting chemicals (16) Green R&D (17) Green design (18) Environm. management system (19) Environmental competencies (20) Innovation (21) Resource consumption (22) Green product (23) Pollution control |
| 24. Seuring and Müller (2008) | TBL | Comprehensive literature review of sustainable supplier evaluation practices, and recommendations for future developments | None |

| Author(s) (publication year) | Category | Research focus | Criteria |
|--|----------|---|---|
| 25. Sundtoft Hald and Ellegaard (2011) | Green | The paper investigates how performance information travelling between the evaluating buyer and the evaluated suppliers is shaped and reshaped in the evaluation process | (1) Relationship (2) Management (3) Technology (4) Delivery (5) Quality |
| 26. Wang Chen et al. (2016) | Green | Comprehensive study relating superior supplier environmental performance to the success in the overall green supplier evaluation model | (1) Cost (2) Quality (3) Delivery (4) Technology (5) Flexibility (6) Financial capability (7) Culture (8) Innovativeness (9) Relationship (10) Pollution production (11) Pollution control (12) Resource consumption (13) Eco-design (14) Environm. management system (15) Green image (16) Green competencies (17) Green product (18) Staff environmental training (19) Management commitment (20) Green technology |
| 27. Winter and Lasch (2016) | CSR | Development of environmental and social criteria in the complex environment of modern fashion industry | (1) Child labor (2) Forced labor (3) Discrimination (4) Disciplinary and security practices (5) Freedom of association (6) Working hours (7) Employment compensation (8) Health and safety (9) Housing conditions (10) Home worker conditions (11) Employment contracting (12) End-of-pipe control (13) Use of eco-friendly materials (14) Carbon and hazardous substance management |
| 28. Xu et al. (2013) | CSR | Finding evaluation criteria for CSR-based supplier evaluation process | (1) Human rights issue (2) Under age labor (3) Long working hours (4) Pollution (5) Safeguarding mechanism in CSR (6) Feminist labor issue (7) Organizational legal responsibilities |
| 29. Yazdani et al. (2017) | Green | Implementation of a complex set of decision-making techniques on a green supplier selection problem | (1) Financial stability (2) Environm. management system (3) Waste disposal program (4) Management commitment (5) Quality control systems (6) Manufacturing (7) Facility (8) Reverse logistics (9) Quality adaptation (10) Price (11) Energy and resource consumption (12) Delivery speed (13) Green design (14) Reuse and recycle rate (15) Production planning |

| Author(s) (publication year) | Category | Research focus | Criteria |
|------------------------------|----------|--|---|
| 30. Yu et al. (2018) | TBL | Development of a hybrid decision-making framework for sustainable supplier evaluation based on both compensatory and non-compensatory decision rules | (1) Cost (2) Quality (3) Delivery (4) Service (5) Flexibility (6) Technology capability (7) Environm. management system (8) Resource consumption (9) Eco-design (10) Reduce, reuse and recycle (11) Health and safety (12) Employee right and welfare (13) Information disclosure |
| 31. Zimmer et al. (2016) | TBL | A comprehensive review of models used for sustainable supplier selection, monitoring and development | (1) Management and organization (2) Financial performance (3) Capabilities (4) External perception (5) Environmental practices (6) Environmental performance (7) Internal social practices (8) Social performance (9) External social practices |

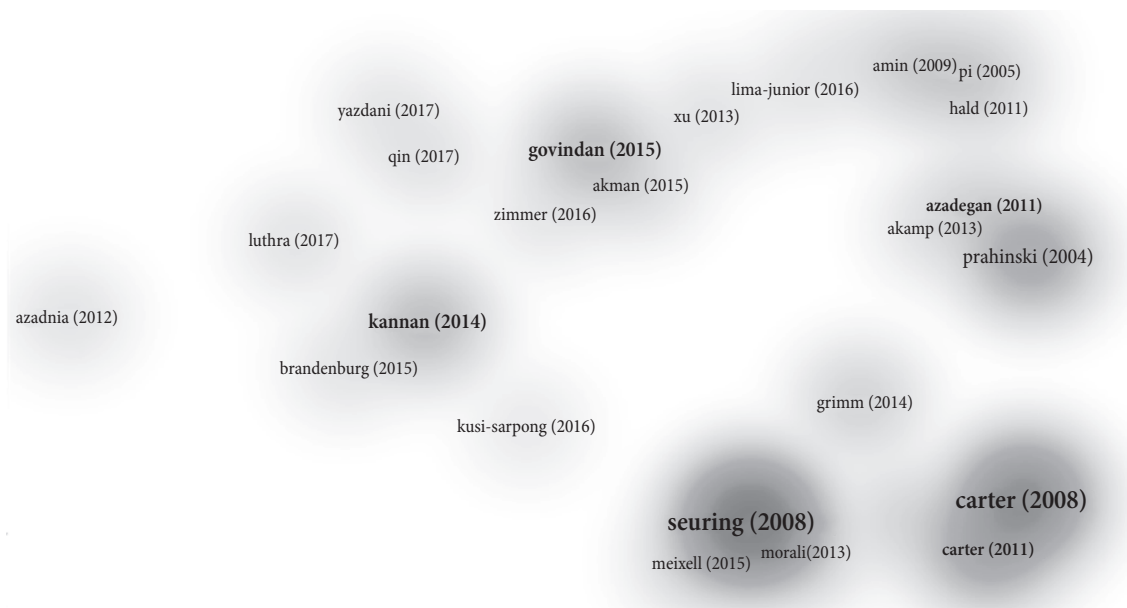
Table 3 shows significant variations regarding the research focus of analyzed SSE papers. The majority of authors concentrate on finding sustainable solutions to supplier evaluation problem within a specific industry [2], [6], [11], [19], [24], [29], [31], [33], [38], [41], [65]. Bearing this in mind, these research approaches still have their merit, especially in pointing out industrial specificities and unique challenges in SSE by bringing up new evaluation criteria, as well as providing innovative means of performance measurement, control and improvement.

Literature review has also shown that many contemporary papers utilized certain modelling, mathematical or statistical techniques to approach, depict or attempt to solve SSE problem [5], [6], [19], [24], [29], [31], [32], [38], [40], [41], [44], [50], [64], [65]. Successful implementation of a specific decision-making technique is vital for increasing viability, accuracy and comparability of supplier assessment, as well as providing necessary automatization of the SSE process as a strategic and operational step in the entire supply chain. Predominant approach in this sense is modelling using multi-criteria decision making (MCDM), such as ANP/AHP [5], [6], [11], [14], [19], [20], [23], [35], [40], [44], [47], [51], [54], [63], [66], TOPSIS [5], [6], [11], [36], [43], [50], VIKOR [2], [44] and DEMATEL [40], [64], which are recently very often combined with techniques modelling artificial intelligence, predominantly fuzzy theory [5], [6], [11], [24], [38], [41], [55], [65] and grey system analysis

[6], [24]. When conducting a research, it is necessary to have a profound knowledge of available methodological approaches in order to prevent the research focus becoming a function of implemented methodology. Conceptual papers that provide an in-depth analysis of contemporary SSE approaches and their corporate strategic relevance are also of great theoretical importance [1], [13], [15], [16], [17], [30], [46], [56], [60]. These articles provide significant scientific contribution in terms of relating supplier performances to the overall supply chain performances, as well as confirming the correlation between successful SSE process implementation and an overall corporate performance improvement. Figure 2 confirms this by showing that within analyzed literature theoretical foundations laid in certain conceptual papers [16], [17], [56] are most commonly referenced in contemporary literature.

Supplier assessment parameters determine the overall outlook of the research, as well as the strategic disposition of SSE within the entire sustainable supply chain management. Summarized supplier evaluation criteria implemented in the analyzed studies were shown previously in Table 3. Presented papers implemented a wide variety of differing supplier evaluation criteria, and although deriving a unanimous systematic approach to SSE may initially seem impossible, certain common views on assessing specific segments of sustainable supplier performances can be detected amongst the authors.

Figure 2: Density visualization depicting the referencing frequency of analyzed papers (only papers which have been referenced ten or more times are shown)



Certain approaches inspect how suppliers behave and interact on an organizational level [15], [20], [63], some focus on suppliers’ performance related to performing certain specific activities [55], [64], whilst the majority of authors consider both aspects. Following this line of thought, supplier evaluation aspects of contemporary SSE publications were analyzed from two angles – performance and organizational. Categorization findings are summarized in Table 4.

We can see that traditional economic criteria such as financial aspect, delivery, quality and technology still present the basis of modern sustainable supplier performance assessment criteria. When analyzing financial matters, authors mainly focused on costs [2], [5], [6], [11], [19], [24], [31], [38], [44], [61], [65], [67], prices [41], [44], [55], [64], financial capability/stability [55], [61], [64], [67] and profitability [11], [44]. Contrary to the presented classification, certain authors observed specific organizational characteristics as evaluation criteria [6], [11], [19], [55], [63], [67], rather than as an observational perspective.

Another identified trend is the increasing presence of newly emerging environmental and social evaluation areas regarding supplier capacity to meet ever-increasing sustainable supply chain management demands. Table 4 depicts the emphasis on the importance of environmental

innovations in contemporary SSE literature, manifested through green products and design [2], [5], [44], [55], [61], [64], [65] and green business activities [2], [6], [29], [38], [40], [44], [55], [61]. Macro environmental managerial concepts, such as environmental impact assessment and total product life cycle management are gaining momentum in scientific application, although inherent difficulties related to modelling applications of these complex criteria are still being overcome, such as criteria quantification, comprehensive estimation, etc. [12], [27], [39] which may require redesigning the product, is often considerable. Thus, prudent product design necessitates the selection of electronic components and product architecture, considering the cost of mitigating an obsolete design and other costs related to the design and manufacture of a product. Accordingly, we develop and analyze a model that shows how a product design can be effectively tailored to a particular product’s life cycle.”, container-title:”Production and Operations Management”, DOI:”10.3401/poms.1080.0056”, ISSN:”1059-1478”, issue:”5”, journalAbbreviation:”Prod. Oper. Man ag.”, language:”English”, note:”WOS:000259794000002”, page:”497-512”, source:”Web of Science”, title:”Product design for life-cycle mismatch”, volume:”17”, author:”{ family:”Bradley”, given:”James R.”}, { family:”Guerre ro”, given:”Hector H.”}”, issued:”{ date-parts:”[”2008”, 1

Table 4: Summary of analyzed SSE literature, with a detailed overview of supplier performance and organizational aspect criteria

| Supplier evaluation aspect | Supplier evaluation criteria | Author(s) |
|----------------------------|---|---|
| Performance aspect | Financial considerations | Akman, 2015; Azadnia et al., 2012; Banaeian et al., 2015; Boutkhoul et al., 2016; Chan and Chan, 2010; Diba and Xie, 2019; Ghadimi et al., 2019; Govindan et al., 2016; Grimm et al., 2014; Khan et al., 2018; Laosirihongthong et al., 2019; Luthra et al., 2017; Qin et al., 2017; Sen et al., 2018; Yazdani et al., 2017; Yu et al., 2018; Zimmer et al., 2016 |
| | Delivery | Akman and Müller, 2013; Akman, 2015; Azadnia et al., 2012; Chan and Chan, 2010; Diba and Xie, 2019; Ghadimi et al., 2019; Govindan et al., 2016; Khan et al., 2018; Kusi-Sarpong et al., 2016; Laosirihongthong et al., 2019; Sen et al., 2018; Yu et al., 2018 |
| | Environmental innovations | Akman, 2015; Azadnia et al., 2012; Banaeian et al., 2015; Boutkhoul et al., 2016; Ghadimi et al., 2019; Grimm et al., 2014; Kannan et al., 2014; Khan et al., 2018; Kusi-Sarpong et al., 2016; Luthra et al., 2017; Qin et al., 2017; Yu et al., 2018 |
| | Quality | Akman, 2015; Azadnia et al., 2012; Banaeian et al., 2015; Carter, 2005; Chan and Chan, 2010; Ghadimi et al., 2019; Govindan et al., 2016; Kannan et al., 2014; Khan et al., 2018; Laosirihongthong et al., 2019; Luthra et al., 2017; Qin et al., 2017; Sen et al., 2018; Sundtoft Hald and Ellegaard, 2011; Yu et al., 2018; Zimmer et al., 2016 |
| | Technological and technical considerations | Banaeian et al., 2015; Boutkhoul et al., 2016; Chan and Chan, 2010; Diba and Xie, 2019; Ghadimi et al., 2019; Govindan et al., 2016; Khan et al., 2018; Kusi-Sarpong et al., 2016; Laosirihongthong et al., 2019; Luthra et al., 2017; Sen et al., 2018; Sundtoft Hald and Ellegaard, 2011; Yazdani et al., 2017; Yu et al., 2018; Zimmer et al., 2016 |
| Organizational aspect | CSR considerations | Carter, 2005; Grimm et al., 2014; Kannan et al., 2014; Khan et al., 2018; Luthra et al., 2017; Sen et al., 2018; Xu et al., 2013; Yu et al., 2018; Zimmer et al., 2016 |
| | Environmental management system | Akman, 2015; Azadnia et al., 2012; Banaeian et al., 2015; Boutkhoul et al., 2016; Chung et al., 2016; Diba and Xie, 2019; Ghadimi et al., 2019; Kannan et al., 2014; Khan et al., 2018; Kusi-Sarpong et al., 2016; Laosirihongthong et al., 2019; Luthra et al., 2017; Sen et al., 2018; Qin et al., 2017; Winter and Lasch, 2016; Yu et al., 2018; Zimmer et al., 2016 |
| | Human resources management | Azadnia et al., 2012; Boutkhoul et al., 2016; Carter, 2005; Grimm et al., 2014; Kannan et al., 2014; Khan et al., 2018; Laosirihongthong et al., 2019; Luthra et al., 2017; Sen et al., 2018; Qin et al., 2017; Xu et al., 2013; Yu et al., 2018; Zimmer et al., 2016 |
| | Legal considerations | Azadnia et al., 2012; Carter, 2005; Kannan et al., 2014; Khan et al., 2018; Laosirihongthong et al., 2019; Luthra et al., 2017; Sen et al., 2018; Xu et al., 2013; Yu et al., 2018 |
| | Pollution control and environmental impact assessment | Azadnia et al., 2012; Boutkhoul et al., 2016; Ghadimi et al., 2019; Govindan et al., 2016; Kannan et al., 2014; Kusi-Sarpong et al., 2016; Laosirihongthong et al., 2019; Qin et al., 2017; Sen et al., 2018 |
| | Total product life cycle management | Boutkhoul et al., 2016; Kannan et al., 2014; Kusi-Sarpong et al., 2016; Qin et al., 2017; Winter and Lasch, 2016 |

0]]]]],{"id":1588,"uris":["http://zotero.org/users/2792031/items/FM2VWXPI"],"uri":["http://zotero.org/users/2792031/items/FM2VWXPI"],"itemData":{"id":1588,"type":"article-journal"},"abstract":"As the sustainability improvement becomes an essential business task of industry, a number of companies are adopting IT-based environmental information systems (EIS).

Regarding the organizational SSE aspect, philosophy of sustainability has had a deeper, more comprehensive impact on strategic decision-making process, rather than on operational managerial level. CSR policy and managerial implications, environmental management, human resource management and legal adherence are identified as dominant corporate strategic managerial

areas with significant influence on the SSE process, and ultimately sustainable supply chain management. This is confirmed by increasing presence of sustainable practices in developed markets, such as increasing market share of fair-trade products, sweat shop awareness and social housing projects. It is also important to mention certain authors who, although did not focus on analyzing specific supplier performance aspects, still provided a macro-strategic overview of the SSE process [44], [61].

Having analyzed contemporary approaches towards SSE, in order to provide a comprehensive conclusion, an insight into the successfulness of these studies in tackling modern scientific and practical challenges, mainly theoretical uniformity and practical applicability is required.

Theoretical uniformity in contemporary literature

Certain analyzed papers emphasized some significant conclusions regarding SSE, such as the positive link between sustainability, corporate competitiveness and performance [17]; supplier performance and supplier evaluation [1]; and the overall profitability of environmental awareness explained by Hoffman and Bazerman in 2005 (cited in [17]). Despite these findings, the lack of a uniform approach to SSE, based on TBL sustainability principle is quite apparent. This study showed that only 33.3% of all analyzed papers can be regarded as SSE studies which implemented TBL sustainability framework. When implemented evaluation criteria are also taken into account, the theoretical concept of sustainability is diluted even further. Additionally, analysis and clustering of most commonly occurring words in titles and abstracts of analyzed literature was performed and its results are shown in Figure 3.

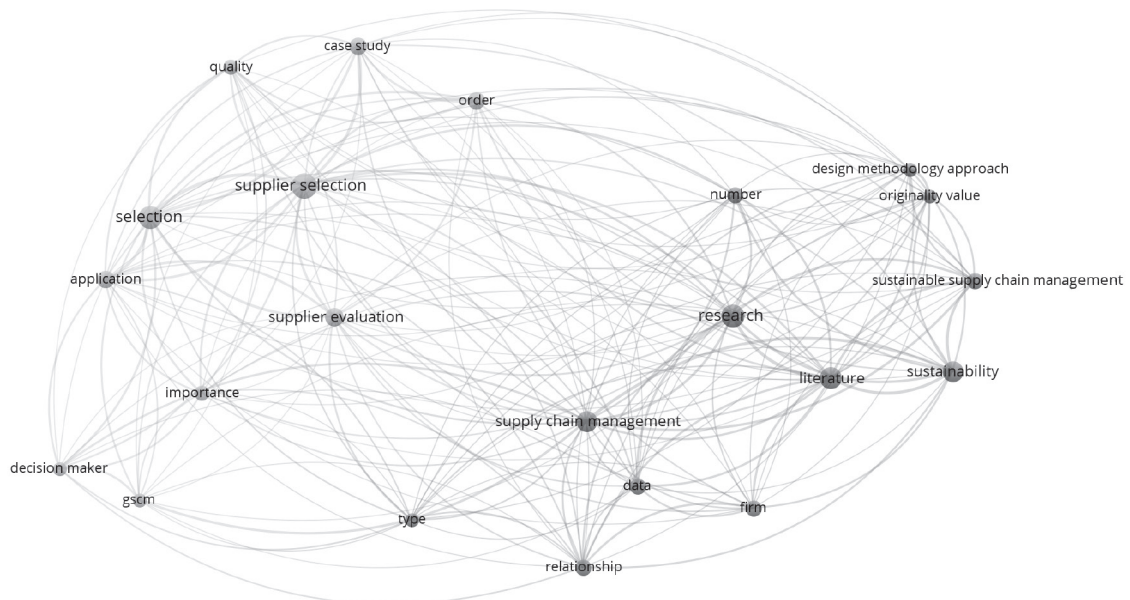
Depicted analysis confirmed three important points identified in contemporary literature. Firstly, the fact that no single term possesses an outstanding presence suggests a wide dispersion of research focuses and methodological approaches, characteristic of newly emerging, expanding scientific topics. Secondly, a relatively mediocre presence of terms such as ‘supply chain management’, ‘sustainable supply chain’ and ‘green supply chain’ shows a distinctive

lack of a wider scientific and managerial context. Lastly, relatively low presence of the term ‘sustainability’ suggests a still existing methodological gap in SSE topic researches. From this perspective, the following proposition can be derived:

P2: Contemporary literature does not possess a consensus on a theoretically uniform SSE model.

Evaluation criteria used in analyzed papers are either too broadly defined, with vague, often overlapping classification boundaries [2], [5], [6], [19], [30], [31], [60], [61], [62], [64], or too specific, problem-orientated, without a broad interindustrial applicability [1], [11], [24], [29], [36], [38], [40], [41], [50], [63], [65]. All these approaches lack a single-directional anchorage in TBL philosophy of sustainability and are too often adapted to implemented modelling techniques [13], which undermines the effectiveness and accuracy of derived results, increasing the research biasedness. Sustainability is not an operational coverage issue, but rather a strategic, long-term, development-orientated business philosophy [7], [52]. Theoretical uniformity in sustainable supplier evaluation process is achieved not through conceptualizing sustainability as a collection of three independent dimensions with contextual cohesion, but rather as a basic principle and a guiding mindset for supply chain decision-making processes on all hierarchical business levels [13], [56]. This line of reasoning

Figure 3: Network visualization depicting most commonly occurring terms in analyzed literature (only terms with occurrence frequency higher than 5 are shown, representational significance is 60%)



consequently applies to standardization of solutions regarding evaluation criteria of different suppliers on all hierarchical decision-making levels, regardless of the industry in which the evaluation is being performed [13], [67]. The lack of sustainable philosophical understanding is most obvious when observing relatively subordinated roles of environmental and social criteria, reflected in the lack of a comprehensive categorization method, as well as the neglect of synergetic corporate value-creation potential of these business aspects [13], [56], [67], often manifested as a form of corporate sustainability myopia.

Practical applicability in contemporary literature

Of all the analyzed publications (both SE and SSE) shown in Table 1, 18 (35.3%) were categorized as multi-industrial in their nature. Of those, 12 (23.5%) can be considered SSE papers. It is important to note that of these papers 7 are literature review papers which approached the topic of SSE from a critical standpoint, emphasizing significant drawbacks of contemporary literature, such as the lack of macro applicability of SSE solutions for whole industries [13], and of remaining 5 research articles only 2 (3.9%) implemented TBL principle in SSE, although either in the context of purchasing social responsibility [15] or specificities of SSE conduct in developing countries [1]. It is apparent that original research efforts aimed at tackling SSE problem on both operational and strategic interindustrial level based on TBL sustainability principle are still lacking in volume and consistency. Although research diversity provides the necessary “richness” of academic thought and a wide diapason of specific SSE solutions which can be implemented in the adequate situations, adhering to contextual problem-oriented limitations, it can be concluded that contemporary literature does not provide an SSE model which can be implemented broadly in different industries, without having to undergo significant alterations. With this in mind, the following proposition can be derived:

P3: Existing SSE models are not adapted to a wide interindustrial application.

The reason for this is a wide dispersion of research focuses in different studies, shown in Table 3. Most analyzed SSE papers are orientated at solving individual problems

related to specific companies, countries or industries, rather than providing a general evaluation framework with incorporated flexibility to respond to industry-specific challenges. Another issue is that implemented SSE models are developed in such a way as to ensure the “best fit” to the preferred research and assessment methodology [5], [20], [31], [40], [64], sometimes leading to a methodological research myopia.

Discussion

Witnessing significant managerial and business disruptions, an adequate, comprehensive, efficient and effective supplier evaluation system is needed, one that provides both operational reasoning and strategic long-term outlook. In the wake of the last couple of years, inspired by the Paris Agreement of 2015, the world is slowly moving towards sustainability. Sustainability is a hereditary requirement which we are obliged to introduce to current corporate governing techniques. In this respect, the decision on whom to partner with has become essential. Therefore, we can conclude that supplier evaluation has become a topic which no longer has the luxury of evolution. Revolutionary steps, mainly in the domain of theoretical contextuality and practical uniformity are necessary in order to ensure that the new approach to SSE is able to cope with upcoming challenges of our modern, global society.

Research efforts which are not soundly based in theoretical knowledge often fall short of the goal of furthering the knowledge base in the field of SSCM, and are usually confined within the short scope of their specific problem-oriented perspective [56]. Theoretical uniformity of developed models within the topic of SSE will be denoted by the equally dispersed scientific footing based in TBL philosophy [13], [67]. This does complicate the overall research itself and requires certain “leaps of faith” in terms of methodological innovations but in turn provides the only viable long-term strategic solution in the context of SSCM. Academic efforts in this domain will undoubtedly progress in this direction but will be additionally accelerated from the corporate perspective as more and more companies start introducing principles of sustainability in their corporate governance. A scientific

topic with a strong anchorage in the corporate world usually gains in research momentum. With the further development of SSE models, an academic consensus on SSE methodological uniformity will be required in order to introduce theoretical and practical standardization to this topic.

Future researches on sustainable supplier evaluation should be outlined and guided by practical applicability of its findings in different industries. Every company has its network of suppliers, which implies that adequate supplier assessment and selection is the “bane” of all industries. SSE models must be implementable interindustrially with comparable end results based on theoretical uniformity. As seen from this paper, the field of SSE still presents “uncharted waters” in modern business decision-making activities, with a huge potential for improving corporate performance, productivity and market success. There are many ways in which SSE can be made a viable strategic tool through intraindustrial supplier evaluation standardizations, allowing for comparison and ranking of closely related competitors and the increase in intraindustrial communications regarding the results of conducted corporate SSEs. This would increase awareness and transparency within specific industry sectors and lead to future implementations of much detailed SSE approaches, with multi-level performance indicators and standardized supplier performance measurement instruments.

SSE process must also possess the capacity to respond to specific industry-related challenges. Every industry is unique in its specific challenges and requirements. When coupled with national market environment factors the outcome is a very complex business conjecture [67]. These complexities should be answered in all segments of business conduct, including supplier evaluation. To respond to contextual peculiarities, developed SSE approach will have to be flexible enough to adhere to specific intraindustrial challenges and to incorporate these considerations into the evaluation framework, without compromising the accuracy and comparability of derived results.

The final aspect of SSE process is the potential to adapt to requirements from both multinational corporations (MNCs) and small and medium enterprises (SMEs). The difference between MNCs and SMEs is a very complex,

multi-dimensional matter. It includes many strategic, organizational, legislative, financial, ethical and technological considerations which influence all business segments and activities, including supplier evaluation process. One of the main differences is the fact that MNCs operate on a global scale, while SMEs often operate locally or on a national level, but this is also changing due to rapid advances and developments in information technologies [34]. MNCs have international supply chains which increase the complexity of logistic and procurement activities. This is reflected in a more detailed and comprehensive approach to supplier evaluation [18]. MNCs are expected to have a higher relevance priority of environmental and social considerations when evaluating their suppliers. Also, their overall evaluation process is usually more complex with a higher number of precise, measurable and quantifiable performance indicators, more transparent activities, as well as certain considerations and requirements, such as specific supplier certificates and practices. However, this cannot be taken as a rule of thumb because certain SMEs have important ties to local communities, which can result in high environmental and social corporate awareness [67]. Another related issue is whether the company in question operates in a developed or developing country.

Every corporate market entry requires a comprehensive external situational analysis in order to adequately understand and respond to specific political, economic, social, technological, legislative and environmental challenges [1]. MNC operating in an international environment with a highly differentiated market portfolio in terms of the national development level must incorporate many local specificities in its business decision-making process, which have a significant effect on the outlook of implemented SSE model. Another important point is a much more complex internal structure of MNCs in comparison to their SMEs counterparts. Large organizations with big employee pools rely on standardized and transparent procedures and formal communication channels. This is also reflected on a corporate SSE model in terms of number, complexity and structure of observed supplier performance indicators, which tend to be more numerous, detailed, precise, numerically expressed, and comparable, than in the majority of SMEs.

Conclusion

This research pointed out certain conclusions regarding theoretical foundations of contemporary papers on the topic of supplier evaluation and selection. Although the main functioning principles of both traditional and sustainable supplier evaluation processes are the same, the differing point is the inclusion of sustainability principles in the supplier assessment process. Modern supply chain challenges require comprehensive decision-making process which takes into account economic, environmental and social opportunities and threats [32]. This has significant implications on the rising importance of supplier assessment aimed at determining suppliers' capacity to deliver sustainable performances. Only through comprehensive acknowledgment of issues from all three sustainability dimensions can efficient and effective strategic and operational decisions be derived. In this sense, a necessary step in establishing a successful long-term SSCM is the corporate introduction of an SSE model based on TBL philosophy [17]. Partial consideration of only one or two sustainability aspects leads to potential sustainability myopia, which could in the long run endanger corporate performance [13], [16], and even existence in ever more sustainability-orientated modern business environment. The research also pointed out that higher hierarchical SSE decision-making levels are somewhat easier to standardize than the lower, more operational criteria levels, mainly due to specific problem-solving orientation [56].

Future applications and development of SSE will be in the direction of solving two most significant challenges – theoretical uniformity and practical applicability. This implies that the scientific consensus on the necessity of incorporating TBL philosophy in corporate governance is required. In the context of SSCM, this implies adhering to sustainability requirements in a comprehensive manner, respecting all three dimensions equally and basing strategic and operational decision-making process on these considerations. In terms of supplier evaluation, business processes and activities should be assessed through their overall contribution to the sustainability of the entire strategic value network. In this respect, papers focusing on reviewing methodological approaches in SSE will gain in momentum and importance, since profound

knowledge and understanding of applicable modelling techniques and their combinations is required in order to avoid “methodological myopia” in which the research focus and goal is subordinated to implemented methodology. MCDM methodologies are becoming a dominant go-to solution for tackling SSE topic, and are oftentimes coupled with artificial intelligence techniques, mainly fuzzy theory.

Concluding thoughts go to the fact that all modern business processes are influenced by internal and external factors. Large corporations are slowly adapting their organizations to respond to these new challenges, whereas the newly emerging companies are basing their existence on opportunities found in accelerating sustainability momentum. Modern supply chains must forego traditional beliefs and turn towards equal acknowledgment of economic, environmental and social aspects. A vital part of this change will be adequate evaluation, control and development of existing and potential suppliers, who are an inevitable link in the modern corporate supply chain value networks.

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