

A Contingency Logic -Based Framework for Supplier Performance Evaluation

Nacereddine Bouriche ¹

¹ Faculty of Economics , Business and Management Sciences, Mohammed Khider University of Biskra (Algeria), nacereddine.bouriche@univ-biskra.dz

Received: .29../09.../2022 **Accepted:** 19.../03/2022 **Published:**.12../04/2022

Abstract

A contingency approach using the analytic hierarchy process method for supplier' selection is proposed to improve an Algerian supply chain's performance belongs to wires/cables industries. Although prior studies suggested several approaches for supplier's selection, to our best knowledge, only few frameworks have incorporated the company's strategy in the supplier' performance evaluation using the analytic hierarchy process within a contingency logic. This paper intends to fill this gap by employing the most common set of key performance indicators derived from the literature with regards to expert' opinion in wires/cables industries. Besides, the proposed framework solved a problem of multi criteria decision attribute. Also, it addresses a problem of using an outdated method in supplier' selection. Furthermore, the proposed framework suggested that behavioural factor should be considered solely without incorporating the price/cost metric to cancel its potential negative effect on the strategy alignment as a contingency logic.

Keywords: *Contingency theory, Supplier Performance.*

JEL Classification Codes: H11..., C52..., P23...

1. INTRODUCTION

Over more than the three past decades, emphasis on upstream risk has been gaining more attention by academics and practitioners. Outsourcing has constantly constituted a crucial element of companies' strategy aimed at

Corresponding author: Nacereddine Bouriche, **e-mail:** Nacereddine.bouriche@univ-biskra.dz

improving their quality and market share. The purchasing share commonly ranges from 30% to 90% of the total turnover(Bruno et al., 2012). Hence, supplier's selection process has become a critical concern faced by firms (the buyers). In this respect, supplier' performance improvement is considered as an essential contributor to the buying company's competitive position and therefore to its SC' performance improvement.

Decisions about selecting best supplier are usually complicated for several aspects such as conflicting evaluating criteria and several unquantifiable factors like the behavioural ones. Thus, Selecting the right supplier is always a challenging mission for the procurement management. Furthermore, supplier' selection is a strategic concern in supply chain management (SCM). Selection the right supplier contributes to product innovation and helps attain efficient production processes (Dey, Bhattacharya, and Ho 2015). Therefore, supplier selection is considered as a critical issue in SCM for sustaining a competitive advantage.

Traditionally, supplier selection has predominantly focused on financial performance indicators, but after 1980s another set of essential factors including the behavioural ones, especially the non-financial key performance indicators(KPIs) such as quality, flexibility, delivery and environmental performance have been also highlighted (Genovese et al., 2013; Glock et al., 2017; Kilincci & Onal, 2011; Li & Zabinsky, 2011; Liu et al., 2019; Motevali Haghighi et al., 2016).

A study directed by PwC and the Business Continuity Institute in 2013, revealed that 75% of companies suffer at least one main supply chain disturbance a year and most of the disturbances were the outcome of supply-based problems(Yoon et al., 2018). Consequently, to grasp and sustain competitive advantages, companies should improve the performance of their supplier' base(Glock et al., 2017). To support supplier progress in practice, researchers have advanced decision support frameworks/systems that assist in selecting and implementing appropriate supplier development activities(Glock et al., 2017). A performance measurement system (PMS) is several metrics employed to measure actions' efficiency and effectiveness(Neely et al., 1995) . Hence, PMS is critical for companies to measure both the effectiveness and efficiency of their supplier. One of the

utmost function of a PMS is supporting the employment of strategies at several levels(Maestrini et al., 2018) including the supplier level.

The strategy employment at several levels of the company implies a solid commitment in strategic planning to produce constant organisational objectives which can then be communicated throughout the organisation (Nair et al., 2015). Applied to supplier selection context, counting for purchasing in strategic planning affords transparency on required supplier roles and qualifies selection of appropriate supplier for organisational strategic capabilities' consolidation(Nair et al., 2015). In this vein, the structural contingency theory (Galbraith, 1973) advocates that how well an organization performs rests on the degree to which the strategy that it seeks to pursue is aligned with its design. This alignment between strategy and performance is described as “fit” in the strategic management literature (Milgrom and Roberts, 1995). In the SC context, contingency theory suggests that the supplier' performance evaluation should be aligned with the company's strategy.

In this paper, to align the supplier' selection objective with the company's strategy objective, the proposed contingency-based framework using the AHP method suggested that the price/cost criterion which is included in almost previous frameworks or constructs of supplier' performance evaluation should be excluded from the evaluation criteria and that to cancel its potential negative effect on the company's strategic objective; this fits the company case study as a situational/contingency reason from the author's observation based on a previous research on the same company, wherein the author observed a deliveries' delay.

To test the applicability of the proposed approach, a wire/cable company as a case study has been chosen.

Wires and cable industries carry out three basic jobs, they transfer communications and/or energy, or they carry loads, or they intermittently perform both jobs. Due to these key jobs, wires and cables industries have a significant socio-economic impact on all socio-economic sectors. Therefore, it is indispensable to measure these industries' supplier's performance for which an efficient framework should be designed. To do this, a set of KPIs from the literature and wire/cable industry experts'

opinions are selected to guide the buyer to have an in-depth comprehension of the Supplier' PM process. The framework is implemented to measure and evaluate a wires/cables industry's supplier' performance in an Algerian wire/cable company context.

The classical approach to supplier performance evaluation was simply on the basis of cost/price factors. However, companies ultimately have realised that their approach which stresses cost/price as the single criterion is ineffective and needs to be improved (Parthiban et al., 2013). Thus, the multi-criteria methods have been addressed. These multi-criteria decision making (MCDM) methods have also become more complex as environmental, social, or in general the behavioural factors have been added along with the traditional criteria (Parthiban et al., 2013). For other hand, the AHP method, can be regarded as another MCDM method as well as a PMS which can be used to solve the problem of the criteria multitude alongside the unquantifiable feature problem of the behavioural factors. In this paper, to overcome the criteria multitude problem and to cancel the price/cost's effect on the company's strategic objective, a framework based on the contingency logic and the AHP method is introduced for supplier' performance evaluation.

To the best of our knowledge, this is the first paper that deals with the wires/cables industries in terms of supplier's selection using the AHP method from the contingency theory approach view point. Besides, there is no a unique or universally agreed model/framework for supplier' selection for all buyers' types. furthermore, the study integrates the exploration of the general literature on the related KPIs and the wire/cable experts' opinion to design a comprehensive set of KPIs that suits the company case study from a contingency logic. More importantly, the study lends a clear sign to the necessity of excluding some performance evaluating criteria/factors for the supplier as a contingency theory logic, wherein the company's strategic objective has been considered. A framework is introduced to fill these gaps and guide top decision-makers in improving their supplier's selection process. Due to the flexibility of the proposed framework, it can be implemented for other supplier belong to other industries' scenarios.

The paper is structured as follows. In Section 2, the relevant literature is revised. The suggested framework is presented in Section 3. Section 4 defines the real-life case study alongside research methods and data collection. The numerical experiments, results analysis and discussion are shown in section 5. As a final point, conclusions and perspective research are drawn in Section 6.

2. LITERATURE REVIEW

In this section, some pertinent papers are reviewed, by which approaches/frameworks and a number of metrics to supplier's performance measurement and selection are presented.

Kilinci and Onal(2011) suggested a fuzzy AHP- based methodology to solve the supplier selection problem of a washing machine company. They used Macros in MS Excel to calculate the priority weights of the alternatives based on the questionnaire forms. A comparative analysis between the methods Fuzzy TOPSIS (Fuzzy Technique for Order of Preference by Similarity to Ideal Solution) and Fuzzy AHP has been made in the context of supplier' selection decision making; both methods were applied to the selection of supplier of a company in the automotive production chain (Lima-Junior & Carpinetti, 2020).

Galankashi *et al.*(2016) proposed an integrated Balanced Scorecard–Fuzzy AHP model to select supplier in the automotive industry. Measures used in the study were gathered using a literature survey and Nominal Group Technique. A modified variant of the Fuzzy Preference Programming method was proposed and demonstrated for supplier' evaluation with the example of a hypothetical metal manufacturing company in the environment of an electronic marketplace (Chamodrakas *et al.*, 2010). Inemek and Tuna (2009) conducted an extensive literature review of Global supplier selection strategies and implications for supplier performance from a Turkish supplier' perception . Findings revealed that quality, delivery, and price along with commitment and trust are the utmost dimensions in global supplier selection and establishing long-term supply relationships. The authors reviewed 311 studies published in refereed journals between 1990 and 2007 related to procurement and logistics. The study illustrates that 44 criteria were used in the evaluation and selection of

suppliers, wherein quality found to be the highest frequency and was perceived to be the most important criterion, followed by delivery and cost.

Parthiban *et al.*(2013)presented an advanced approach of MCDM techniques . They applied the fuzzy logic, strength-weakness-opportunity-threat (SWOT) analysis, and data envelopment analysis (DEA) on an automotive component manufacturer. Their approach includes quality, delivery, productivity, costs and services as supplier' performance criteria. Parthiban and Abdul Zubar(2013) proposed An integrated multi-objective decision making process for the performance evaluation of the supplier through the application of the MISM technique (modified interpretive structural modelling), impact matrix cross-reference multiplication applied to a classification, and AHP. Their decision model compromised 10 criteria including the cost. The study was done in an automotive component manufacturing industry. Sevkli *et al.*(2007) integrated the data envelopment analytic technique and the AHP dealing with a real case study. Their framework employed more than 20 criteria including the cost.

A two-step approach using fuzzy AHP and fuzzy technique for TOPSIS has been proposed for MCDM and illustrated using a numerical example. Beikkhakhian *et al.* (2015) used a hybrid approach including the interpretive structural model, the fuzzy hierarchical analysis method , the TOPSIS model and the fuzzy TOPSIS method alongside the AHP method. Polat and Eray(2015) integrated the AHP method and the evidential reasoning (ER) to supplier selection in railway projects. Their model used 8 criteria. Liu *et al.*(2019) developed A fuzzy decision tool to evaluate the sustainable performance of supplier in an agri-food value chain according to the triple bottom line of economics, environmental and social aspects. The proposed model integrates triangular fuzzy numbers (TFN), AHP and TOPSIS.

The relevant literature shows minimal research on the supplier' selection using both the AHP method with regards to the contingency theory while excluding the price/cost factor from the contingency theory view point to emphasise more the company's strategic objective importance. Furthermore, the suggested framework deals with experts' opinion while considering the related literature and that makes the proposed

approach more realistic and robust. Moreover, the complexity of mathematics models has been avoided to simplify using the proposed framework for operations managers.

Due to their active time, operations managers tend to use straightforward methods in their daily activities. On the other hand, despite the fact that the above frameworks are supported by robust mathematics models. Though, from a simplicity viewpoint, their implementation needs a substantial knowledge in software engineering or in mathematics. Therefore, this study aims to afford a practical and simple model that operations managers (or the buyers) can easily employ in selecting their supplier. Although AHP is a powerful MCDM, its implementation is undemanding and has a shallow learning curve (Mead 2008). These reasons have motivated the author to propose a framework for Supplier' performance evaluation to enhance the decision-making process and to improve the outcomes related to the supplier' PM in an Algerian SC context.

The application in a wire/cable company illustrates the effectiveness of the proposed framework. Finally, the case company's SC manager is illustrated with the proposed framework's results to improve their supplier' selection outcomes.

3. THE PROPOSED FRAMEWORK

3.1. Contingency theory logic to supplier' performance evaluation

It is obvious that supply chain's nature is a system or a set of subsystems i.e., the supply chain partners in which the supplier consists one of the main partners of almost any supply chain's type is a subsystem. Consequently, it is not avoidable to ignore the system thinking when studying the supply chain or any of its subsystems concepts such as the environmental suprasystem, the interrelated nature of its partners as subsystems and the system boundary notion which lead to the concepts of "closed" and "open" systems which have been predominantly useful in integrating process, quantitative and behavioural or qualitative constructs (Luthans and Stewart, 1977). Although, each construct from several approaches to management has been efficient in specific situations,

quantitative constructs have had substantial difficulty accommodating behavioural or qualitative factors, and behavioural theorists have been only slightly effective in solving management problems more adaptable to quantitative approaches. There is need for a new theoretical framework for management that can Integrate diverse process, quantitative and behavioural concepts in- to an interrelated theoretical system and defining specific functional relationships between situational factors, management concepts and applications, and organizational performance (Luthans and Stewart, 1977). In this sense, the AHP can accommodate both the qualitative/behavioural factors and the quantitative ones as it can constitute the new theoretical framework solution for management that can integrate diverse quantitative and behavioural concepts in- to an interrelated theoretical system especially in terms of supplier' performance management. For other hand, the situational approach argues that the most effective management concept or technique depends on the set of circumstances at a particular point in time (Luthans & Stewart, 1977). In this line, contingency theory (Thompson, 1967) infers that no a paramount method can be conducted in all circumstances i.e., that there is no single superlative way or theory to manage an organization (Flynn et al., 2010a). For instance, organisations are always established in an environment which consists of an internal and a situational external context (Waterhouse and Tiessen 1978). Hence, the environment forms the organizations' structures, processes and technologies alongside customers and supplier which are an important part of a manufacturer's environment.

As an extension to contingency theory, structural contingency theory (Chandler, 1962 as cited in Luthans and Stewart, 1977) suggests that how well an organization performs depends on the extent to which the strategy that it seeks to pursue is aligned with its design. This alignment between strategy and performance is described as "fit" in the strategic management literature (Flynn et al., 2010). Applied to SC, structural contingency theory suggests that supplier' performance evaluation and selection should be aligned with the manufacturer's strategy. In addition to organizational and environmental contingencies, a third type of contingency recently emerged in strategy research is the level of performance attained by a business.

Similar to the role played by environmental and organizational contingencies, the level of performance also dictates a range of strategic options available to a business. For example, the alternatives available to a firm whose performance is steadily declining are very different from those available to a firm that is constantly increasing its performance level (Harrigan, 1980 as cited in Ginsberg and Venkatraman, 1985). Consequently, any comprehensive approach for defining the domain of contingency perspectives of strategy should also include performance as a key contingency influence (Ginsberg & Venkatraman, 1985).

From the structural contingency logic, our approach proposes that the AHP method should deal only with the behavioural factors accounting for the strategic objective of the company to avoid the effect of the cost/prices on the strategic objective of the company. On the other hand, AHP has been implemented to enhance the behavioural measurements and overcome the inconsistency problem that frequently occurs when dealing with behavioural factors. Applied to supplier' performance evaluation and selecting, dealing with both behavioural and quantitative (i.e., prices/cost of raw materials in our case study) at the same time using the AHP can lead to results that would contradict the strategic objective of the company. Also, AHP has been chosen due to its simplicity. Simplicity here can be regarded as another situational factor from the structural contingency logic and as a rational reason to apply the AHP.

AHP is implemented to rank a set of supplier' performance according to the most common set of KPIs derived from the literature and the wire/cable industry's experts: quality, delivery, and flexibility. Finally, the importance of each criteria is attained that can help the buyer to improve the PM processes and to reveal the top performant supplier according to the company's strategy.

3.2. Supplier' KPIs in the wire/cable industry

In this section, several performance indicators, while exploring the related literature and according to an in-depth interview's result with a heterogeneous sample of experts (Saunders et al., 2012) from the wires/cables industry, are introduced from which relevant KPIs are

identified (Table. 1).

<i>KPIs(criteria and sub-criteria)</i>	<i>References</i>
1. Cost /Price	(Beamon, 1998; Kim et al., 1997; Whicker et al., 2009)
2. Customer service (responsiveness to inquiry)	(A. Gunasekaran et al., 2001, 2004; Hammami et al., 2020; Posselt & Gerstner, 2005)
3. Flexibility/Reliability(response time and problem-solving ability)	(A. Gunasekaran et al., 2004; Whicker et al., 2009)
4. On-time deliveries (Time-based performance indicator)	(Azzone et al., 1991; Beamon, 1999; Dibrell et al., 2005)
5. Quality requirements (raw material quality, compliance to regulations and specifications and quality of delivery documentation and instructions' compliance)	(Azzone et al., 1991; Angappa Gunasekaran & Kobu, 2007; Persson & Olhager, 2002)
6. Environmental performance	(Blome et al., 2014; Motevali Haghighi et al., 2016)

Table 1. Vital KPIs used in wire/cable industry based on literature and experts' opinion

3.3. The AHP method

Due to its ease of use and flexibility, AHP (Saaty & T.L, 1980) has been considered one of the utmost prevalent MCDM methods so far (Ho & Ma, 2018). It bears behavioural aspects; that was considered a progression compared to other MCDMs methods (Emrouznejad & Marra, 2017). Moreover, it permits to weigh the decision-making inconsistency (Saaty & T.L, 1980), which is considered a distinguishing property compared to other MCDM methods.

In this study, AHP incorporated behavioural KPIs while quantitative ones which were the cost/prices in our case study have been excluded from the model from the structural contingency point of view and that to measure the supplier' performance without affecting the strategic objective of the company case study. Also, AHP permits to embody the experts' obsolete judgments. Accounting for these factors would make the proposed model more effective.

Furthermore, appropriate software like the SuperDecision software enables the decision process considerably, where the inconsistency degree of the decision process can be measured effortlessly. The pairwise

comparison can be repeated to reduce potential conflicts, which constitutes another advantage of the AHP method.

4. A REAL-LIFE CASE STUDY

4.1. Research methods and data collection

This research embraced a case study approach based on an observation of the author during a previous research(Nacereddine et al., 2011), where two main problems which were a delay on a number of deliveries and the price/cost-based method in selecting supplier have been observed. The research has been conducted on a wires/cables industry's supplier. The triangulation method has been employed as a data collection method (Saunders et al., 2012), where a combination between the in-depth interview with a heterogeneous purposive sample of wires/cables experts and archival research alongside partial literature review have been conducted (Saunders et al., 2012).

4.2. Profile of the company

The company named 'Entreprise National des Industries des Cables Biskra' (ENICAB) has been established on 1982 with a 14000 tone /year as production capacity of wires/cables and 800 workers. On 20/05/2008, ENICAB became a General Cable's branch. The company covers about 35% of national needs in all wire /cable types. Actually, an Algerian industrial group has bought all General Cable shares.

The supplier which were the subject of the study consists of a set of a cooper's supplier. The cooper constitutes the principal part of purchased raw materials; it also constitutes the primary strategic raw materials.

Since the company produces a large number of cables/wires types .It has been dealt only with the supplier of strategic raw materials as a non-probabilistic sample (Saunders et al., 2012).

5. IMPLEMENTATION OF THE PROPOSED FRAMEWORK

The AHP implementation as a proposed MCDM technique involves three key stages: (A) Diagnosing the problem; (B) Structuring the decision model, (C) Pairwise comparisons construction (D) Assessing the model and

(E)Results including supper matrices development and discussion (Thomas., 2008).

5.1. Diagnosing the problem

The supplier of cooper (8mm Ø) as the strategic raw material are the subject of the proposed AHP. This type of raw materials represents about 45 % of the overall materials' quantities.

Actually, the company is in progress to implement the ISO 9001:2008 procedures, Nevertheless, the problem of supplier' PM, to this date, is being undertaken in an outdated way which is a cost-based decision method. Further, the company does not apply neither AHP method nor any modern MCDM method concerning its supplier' PM and selection.

Recently, the company received a future project of supplier selection which has been designed as a corresponding phase to be in compliance with the ISO 9001:2008 procedures. However, the aforementioned future project is not an MCDM technique and cannot measure the inconsistency of the decision making process. In these backgrounds, all the pair-wise comparisons have been done depending of the buyer's experience in collaboration with the author.

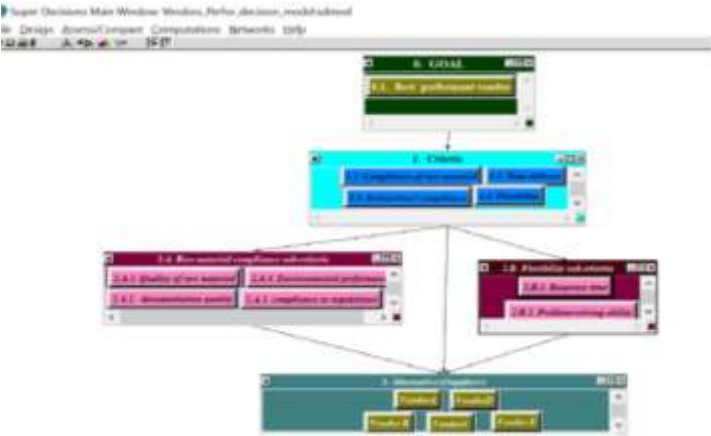
5.2. Structuring the decision model

A MCDM software called 'SuperDecisions' (www.superdecisions.com) has been employed to carry out all calculations and form the AHP structure. Figure. 2. Illustrates the proposed model.

5.3. Pairwise comparisons

The total number of pairwise comparisons is eleven as a specific nine-point scale has been used to conduct all pairwise comparisons; wherein even values are intermediate values (Thomas., 2008). Subsequently, we have 11 matrices: for the criteria cluster there is one matrix and for the sub-criteria clusters there are two matrices; the first is for the sub-criteria under the 'raw material compliance' node; it covers quality of raw material, documentations' quality, compliance to regulations and environmental performance. The other one is for the sub-criteria cluster related to flexibility criteria which covers time to response and solving problem ability nodes. Hence, the rest are eight comparison questionnaires for the five alternatives for all the eight covering criteria (figure. 2).

Figure. 2. AHP model construction’s screenshot



5.4. Assessing the model

The priorities of the factors are calculated. The limit matrix output can be transformed to the relative priorities which are the company’s potential supplier’ total preferences and the prominence of the related evaluation criteria.

5.5. Results (supper matrix development) and discussion

The eigenvectors, which have been figured by the software, are presented by The Limit Matrix. Table. 2. Shows the concluding results.

Table 2. Alternatives (supplier)priorities and ranking

Alternatives	Priorities	Ranking
Supplier B	0.0702	5
Supplier E	0.1328	3
Supplier A	0.3488	1
Supplier C	0.3197	2
Supplier D	0.1285	4

Table 3. priorities of main evaluation criteria

1.1. Compliance of raw materials	0.25
1.2. Time delivery	0.5
1.3. Instruction compliance	0.125
1.4. Flexibility	0.125

The relative importance of evaluation criteria is depicted in Table. 3. Regarding these criteria, ‘delivery time’ was found as the highest significant one (0.5), followed by ‘Raw material compliance’ (0.25). The rest of the evaluation criteria, namely ‘Flexibility’ and ‘Instructions’ compliance’ were found less important than the first two criteria. Their relative priorities were the same (0.125). As to alternatives (Table. 2), the top preferred potential supplier’s performance was ‘supplier A’ (0.3488), followed by ‘supplier C’ (0.3197). The following supplier’ performances were ‘supplier E’ (0.1328) and ‘supplier D’ (0.1285). The smallest preferred supplier’s performance was ‘supplier B’ (0.0702).

According to table.2., from the contingency logic view point, pairwise comparisons should be carried into line with the company’s strategic objective. In this context, in the in-depth interview, the author advised that the buyer should allocate more importance to ‘raw material compliance’ criteria and the ‘delivery time’ which fit more the company’s strategic objective. Hence, the buyer has attached double prominence to the ‘delivery time’ criterion (0.5) dissimilar to the ‘raw material compliance’ criterion (0.25), and a same prominence was given to both the ‘flexibility’ criterion and the ‘Instructions’ compliance’ criterion. That can be reached only when the price/cost criterion should be cancelled as a contingency point of view.

6. CONCLUSIONS AND SOME RESEARCH PERSPECTIVES

In this study, the wires/cables industry supplier’ performance has been measured and evaluated through a structural contingency AHP-based framework, wherein the problem of decision-making related to supplier’ performance has been solved in conjunction with the company’s strategy. According to the company’s experts, the competitive position of the company has declined to the second one in the marketplace; this can be considered as a benchmarking performance’s point. Therefore, the company should review its whole supply chain performance including its supplier’ performance measurement method.

Evaluation supplier’ performance by the buyer can be regarded as a starting point to contribute to the company’s performance improvement and

its SC's performances. In this respect, the AHP method and the contingency logic can present a decision- support roadmap to realise this complex task. Findings revealed that using outdated performance measures such as depending only on price/cost metrics is not enough as it would lead to contradiction with the company's strategy. Furthermore, findings demonstrated that integrating the experts' opinions and the literature review constitutes a significant back-up structure for the decision process improvement.

The proposed framework would help the buyer to have a more effective decision making process for supplier' performance evaluation and selection. Consequently, it will contribute to the SC performance improvement.

Accounting for a new research that advances the establishment of a long relationship based on trust and collaboration between the buyer and the supplier will contribute significantly to the supplier's performance improvement as it will constitute a good compliment for this research.

Acknowledgements

The authors give distinct thanks to the SC manager of the ENICAB, Mr Nacereddine. Houhou, for his considerable assistance. Also, an exceptional thank is due to the rest of the company's experts, the editor of this journal and anonymous referees of this paper.

References

- Azzone, G., Masella, C., & Bertelè, U. (1991). *Design of Performance Measures for Time-based Companies*. 11(3), 77–85.
- Beamon, B. M. (1998). Supply chain design and analysis: Models and methods. *International Journal of Production Economics*, 55(3), 281–294. [https://doi.org/10.1016/S0925-5273\(98\)00079-6](https://doi.org/10.1016/S0925-5273(98)00079-6)
- Beamon, B. M. (1999). Measuring supply chain performance. *International Journal of Operations and Production Management*, 19(3), 275–292. <https://doi.org/10.1108/01443579910249714>
- Beikhhakhian, Y., Javanmardi, M., Karbasian, M., & Khayambashi, B. (2015). The application of ISM model in evaluating agile suppliers selection criteria and ranking suppliers using fuzzy TOPSIS-AHP methods. *Expert Systems with Applications*, 42(15–16), 6224–6236. <https://doi.org/10.1016/j.eswa.2015.02.035>
- Blome, C., Hollos, D., & Paulraj, A. (2014). Green procurement and green supplier development: Antecedents and effects on supplier performance. *International*

Journal of Production Research, 52(1), 32–49.
<https://doi.org/10.1080/00207543.2013.825748>

- Bouriche, N., Wilson, G., & Kishk, M. (2021). *An AHP- Structural Contingency Theory - Based Approach for Supplier Selection : Insights from an Algerian Industrialized Company*, The 4th international conference on Management,Business and Finance, Oxford University, UK.
- Bruno, G., Esposito, E., Genovese, A., & Passaro, R. (2012). AHP-based approaches for supplier evaluation: Problems and perspectives. *Journal of Purchasing and Supply Management*, 18(3), 159–172. <https://doi.org/10.1016/j.pursup.2012.05.001>
- Chamodrakas, I., Batis, D., & Martakos, D. (2010). Supplier selection in electronic marketplaces using satisficing and fuzzy AHP. *Expert Systems with Applications*, 37(1), 490–498. <https://doi.org/10.1016/j.eswa.2009.05.043>
- Dibrell, C., Davis, P. S., & Danskin, P. (2005). The Influence of Internationalization on Time-Based Competition. *Management International Review*, 45(2), 173–195. <https://www.jstor.org/stable/40836046>
- Emrouznejad, A., & Marra, M. (2017). The state of the art development of AHP (1979–2017): A literature review with a social network analysis. *International Journal of Production Research*, 55(22), 6653–6675. <https://doi.org/10.1080/00207543.2017.1334976>
- Flynn, B. B., Huo, B., & Zhao, X. (2010). The impact of supply chain integration on performance: A contingency and configuration approach. *Journal of Operations Management*, 28(1), 58–71. <https://doi.org/10.1016/j.jom.2009.06.001>
- Galankashi, M. R., Helmi, S. A., & Hashemzahi, P. (2016). Supplier selection in automobile industry: A mixed balanced scorecard-fuzzy AHP approach. *Alexandria Engineering Journal*, 55(1), 93–100. <https://doi.org/10.1016/j.aej.2016.01.005>
- Genovese, A., Lenny Koh, S. C., Bruno, G., & Esposito, E. (2013). Greener supplier selection: State of the art and some empirical evidence. *International Journal of Production Research*, 51(10), 2868–2886. <https://doi.org/10.1080/00207543.2012.748224>
- Ginsberg, A., & Venkatraman, N. (1985). Contingency Perspectives of Organizational Strategy: A Critical Review of the Empirical Research. *Academy of Management Review*, 10(3), 421–434. <https://doi.org/10.5465/amr.1985.4278950>
- Glock, C. H., Grosse, E. H., & Ries, J. M. (2017). Decision support models for supplier development: Systematic literature review and research agenda. *International Journal of Production Economics*, 193, 798–812. <https://doi.org/10.1016/j.ijpe.2017.08.025>
- Gunasekaran, A., Patel, C., & McGaughey, R. E. (2004). A framework for supply chain performance measurement. *International Journal of Production Economics*, 87(3), 333–347. <https://doi.org/10.1016/j.ijpe.2003.08.003>

- Gunasekaran, A., Patel, C., & Tirtiroglu, E. (2001). Performance measures and metrics in a supply chain environment. *International Journal of Operations and Production Management*, 21(1–2), 71–87. <https://doi.org/10.1108/01443570110358468>
- Gunasekaran, Angappa, & Kobu, B. (2007). Performance measures and metrics in logistics and supply chain management: A review of recent literature (1995–2004) for research and applications. *International Journal of Production Research*, 45(12), 2819–2840. <https://doi.org/10.1080/00207540600806513>
- Hammami, R., Frein, Y., & Albana, A. S. (2020). Delivery time quotation and pricing in two-stage supply chains: Centralized decision-making with global and local managerial approaches. *European Journal of Operational Research*, 286(1), 164–177. <https://doi.org/10.1016/j.ejor.2020.03.006>
- Ho, W., & Ma, X. (2018). The state-of-the-art integrations and applications of the analytic hierarchy process. In *European Journal of Operational Research* (Vol. 267, Issue 2, pp. 399–414). Elsevier B.V. <https://doi.org/10.1016/j.ejor.2017.09.007>
- Inemek, A., & Tuna, O. (2009). Global supplier selection strategies and implications for supplier performance: Turkish suppliers' perception. *International Journal of Logistics Research and Applications*, 12(5), 381–406. <https://doi.org/10.1080/13675560903181543>
- Kilincçi, O., & Onal, S. A. (2011). Fuzzy AHP approach for supplier selection in a washing machine company. *Expert Systems with Applications*, 38(8), 9656–9664. <https://doi.org/10.1016/j.eswa.2011.01.159>
- Kim, G., Park, C. S., & Yoon, K. P. (1997). Identifying investment opportunities for advanced manufacturing systems with comparative-integrated performance measurement. *International Journal of Production Economics*, 50(1), 23–33. [https://doi.org/10.1016/S0925-5273\(97\)00014-5](https://doi.org/10.1016/S0925-5273(97)00014-5)
- Li, L., & Zabinsky, Z. B. (2011). Incorporating uncertainty into a supplier selection problem. *International Journal of Production Economics*, 134(2), 344–356. <https://doi.org/10.1016/j.ijpe.2009.11.007>
- Lima-Junior, F. R., & Carpinetti, L. C. R. (2020). An adaptive network-based fuzzy inference system to supply chain performance evaluation based on SCOR® metrics. *Computers and Industrial Engineering*, 139(October 2019), 106191. <https://doi.org/10.1016/j.cie.2019.106191>
- Liu, Y., Eckert, C., Yannou-Le Bris, G., & Petit, G. (2019). A fuzzy decision tool to evaluate the sustainable performance of suppliers in an agrifood value chain. *Computers and Industrial Engineering*, 127(November 2018), 196–212. <https://doi.org/10.1016/j.cie.2018.12.022>
- Luthans, F., & Stewart, T. I. (1977). A General Contingency Theory of Management. *The Academy of Management Review*, 2(2), 181. <https://doi.org/10.2307/257902>
- Maestrini, V., Luzzini, D., Caniato, F., Maccarrone, P., & Ronchi, S. (2018). Measuring supply chain performance: a lifecycle framework and a case study. *International*

Journal of Operations and Production Management, 38(4), 934–956.
<https://doi.org/10.1108/IJOPM-07-2015-0455>

- Mead, N. R., & Engineering, S. (2008). *Requirements Prioritization Case Study Using AHP*. September, 1–11. <https://us-cert.cisa.gov/bsi/articles/best-practices/requirements-engineering/requirements-prioritization-case-study-using-ahp>
- Motevali Haghighi, S., Torabi, S. A., & Ghasemi, R. (2016). An integrated approach for performance evaluation in sustainable supply chain networks (with a case study). *Journal of Cleaner Production*, 137, 579–597.
<https://doi.org/10.1016/j.jclepro.2016.07.119>
- Nacereddine, B., Mohammed, K., & Moufida, Y. (2011). An integrated approach of analysing a production system's PMS: A case study. *ISBEIA 2011 - 2011 IEEE Symposium on Business, Engineering and Industrial Applications*, 390–394.
<https://doi.org/10.1109/ISBEIA.2011.6088843>
- Nair, A., Jayaram, J., & Das, A. (2015). Strategic purchasing participation, supplier selection, supplier evaluation and purchasing performance. *International Journal of Production Research*, 53(20), 6263–6278.
<https://doi.org/10.1080/00207543.2015.1047983>
- Neely, A., Gregory, M., & Platts, K. (1995). Performance measurement system design: A literature review and research agenda. In *International Journal of Operations and Production Management* (Vol. 15, Issue 4, pp. 80–116).
<https://doi.org/10.1108/01443579510083622>
- Parthiban, P., & Abdul Zubar, H. (2013). An integrated multi-objective decision making process for the performance evaluation of the vendors. *International Journal of Production Research*, 51(13), 3836–3848.
<https://doi.org/10.1080/00207543.2012.751515>
- Parthiban, P., Abdul Zubar, H., & Katarak, P. (2013). Vendor selection problem: A multi-criteria approach based on strategic decisions. *International Journal of Production Research*, 51(5), 1535–1548. <https://doi.org/10.1080/00207543.2012.709644>
- Persson, F., & Olhager, J. (2002). Performance simulation of supply chain designs. *International Journal of Production Economics*, 77(3), 231–245.
[https://doi.org/10.1016/S0925-5273\(00\)00088-8](https://doi.org/10.1016/S0925-5273(00)00088-8)
- Polat, G., & Eray, E. (2015). An Integrated Approach using AHP-ER to Supplier Selection in Railway Projects. *Procedia Engineering*, 123, 415–422.
<https://doi.org/10.1016/j.proeng.2015.10.068>
- Posselt, T., & Gerstner, E. (2005). Pre-sale vs. post-sale e-satisfaction: Impact on repurchase intention and overall satisfaction. *Journal of Interactive Marketing*, 19(4), 35–47. <https://doi.org/10.1002/dir.20048>
- Saaty, & T.L. (1980). *The Analytic Hierarchy Process* (1st ed.). McGraw-Hill.

Saunders, M., Lewis, P., & Thornhill, A. (2012). *RESEARCH METHODS FOR BUSINESS STUDENTS* (6th ed.). Pearson Education Limited.

Sevкли, M., Koh, S. C. L., Zaim, S., Demirbag, M., & Tatoglu, E. (2007). An application of data envelopment analytic hierarchy process for supplier selection: A case study of BEKO in Turkey. *International Journal of Production Research*, 45(9), 1973–2003. <https://doi.org/10.1080/00207540600957399>

Whicker, L., Bernon, M., Templar, S., & Mena, C. (2009). Understanding the relationships between time and cost to improve supply chain performance. *International Journal of Production Economics*, 121(2), 641–650. <https://doi.org/10.1016/j.ijpe.2006.06.022>

Yoon, J., Talluri, S., Yildiz, H., & Ho, W. (2018). Models for supplier selection and risk mitigation: a holistic approach. *International Journal of Production Research*, 56(10), 3636–3661. <https://doi.org/10.1080/00207543.2017.1403056>