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A review on supply chain performance measurement systems

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Abstract

In today's fierce global environment, continuous performance measurement is the key mantra for any kind of business successes. The performance measurement system is a framework to measure the efficiency of the supply chain. The purpose of this paper is to review the dearth of research into performance measurement systems in the context of the supply chain by reviewing the contemporary literature for the last two decades and evoking the potential avenues for future research. For this purpose, the authors have considered and classified the supply chain performance measurement systems as approaches and techniques and followed a systematic literature review procedure. Finally, this paper discloses that simulation techniques are more suitable than other performance techniques and approaches for the supply chain performance measurement in a volatile environment. The study also provides a strong basis for future researchers and academicians in applying the performance measurement systems in the context of the dynamic supply chain.

Keywords: Supply chain performance measurement; Supply chain modeling; Supply chain simulation, Approaches; Techniques

1. Introduction

In today's volatile market environment, companies are facing huge challenges to satisfy customer requirements. Moreover, competition has shifted from individual firm to the entire supply chain (SC). In this context, supply chain management (SCM) plays a vital role to keep the firm in the global market by organizing the activities from supplier to the end customer effectively. SCM is concerning and managing the business from the procurement of raw material to manufacturing to distribution, customer service and finally reprocessing and disposal of products. Every SC wants to improve their performance to reach the expectations of the customer. Hence, performance measures and metrics are needed to measure the effectiveness and efficiency of the SC. Moreover, every SC or business success

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depends on the effective performance measurement system (PMS). Therefore, an effective PMS is required in the context of SC to measure the right thing at right time. Neely et al.,[1] defined the PMS as the total set of metrics used to measure both the effectiveness and efficiency of action. Kaplan and Norton stated that "No measure, No improvement". Hence, identification of key performance measures (KPM) and selecting the suitable PMS is more important in the success of SC performance evaluation. For the last two decades, many researchers have developed and applied various performance measurement frameworks for different problems of SC (for example identifying the success, bottlenecks, waste, etc.).

There are many researchers who have done the literature review on supply chain performance measurement systems (SCPMS) for the last couple of decades. However, most of the studies considered the performance measures as part of the PMS. Initially, Neely et al.,[2] have reviewed the performance measures and classified them as cost measures, time measures, quality measures, and flexibility measures. Next, Chan et al., [3] have developed an SCPMS framework and presents the key issues in the SC. Similarly, Shepherd and Gunter [4] have presented the taxonomy of the performance metrics based on the nature of the metrics, the dimension of the metrics and SC macro- process. Gunasekaran et al., [5] have classified the articles based on the balanced scorecard perspective, Decision hierarchy level, Measurement procedure, SC measure components and the landscape of the measures. Akyuz et al., [6]categorized the articles based on the SC issues, Points in SCPMS, Prioritization of the metrics, social and organizational features of SCPMS. In the same way, [7] Cuthbertson et al., considered the frameworks, measurement procedure and scope of the PMS to classify the SCPMS. Similarly, Gopal et al. [8] presented the literature based on the PMS Lifecycle phases like design phase, implementation phase, and continuous improvement phase. Subsequently, Ali Najmi et al., [9] and Hasan Balfaqih et al., [10] have classified the articles based on the approaches and techniques in the context of SC. More recently, Vieri Maestrini et al., [11] reviewed the literature related to the SCPMS but this study focused more on the definition of performance measurement. However, they classified the literature based on Journal wise and discipline wise and finally discussed the articles in terms of the SCPMS life cycles.

These days, many organizations are using SCM approaches and techniques due to globalization and dynamic market environment. Therefore, a comprehensive review of SCPMS is required to think over the performance of SC in dynamic nature. Therefore, the intent of this paper is to review the literature related to the PMS in the context of dynamic SC environment. For this, authors have followed a systematic literature review procedure and identified the 127 articles from various databases like Scopus, Google Scholar, and ISI in the period of last two decades.

The rest of the paper is organized as follows: Section 2 describes the literature search procedure. Similarly, section 3 discussed the SCPM approaches. The overview of the SCPM techniques is presented in section 4. Section 5 presents the discussions of this paper. Finally, section 6 concludes the paper.

2. Literature review methodology

Most of the researchers have done an extensive literature review on SCPMS for last two decades. However, these studies have developed frameworks based on a set of performance metrics. Hence, this review focuses on the performance measurement systems in the context of the dynamic supply chain. For this purpose, authors have followed a systematic literature review procedure. Initially, authors have used databases like Scopus, Google Scholar, and ISI to collect the literature from 1998 to 2018. More than 450 papers have been identified in the context of SCPMS with the keywords supply chain performance, supply chain models, supply chain performance measurement and supply chain simulation. Initially, similar kinds of papers collected from different databases were eliminated. Furthermore, non- referred journals like book chapters, white papers and notes were identified to eliminate in the further review process. For more quality papers, the authors have reviewed the title, keywords, abstract and conclusions of the identified papers. Eventually, authors have considered 127 papers to carry out the review process in the context of SCPMS.

3. Approaches

Majority of researchers have classified the performance measurement systems in the context of SC as frameworks, models, approaches, and techniques. However, the authors have classified the SCPMS as approaches

and techniques like as shown in Fig.1. These approaches are further segregated as processed based approaches, perspective based approaches, and hierarchical based approaches.

3.1. Processed based approaches

SCM is the integration of process and activities involved from supplier to the end customer. Many researchers have considered the key operational process of the SC to develop the framework of performance measurement. As shown in figure 1.8 % of the articles have used process-based approaches to develop the SCPMS. Ross [12] have used a process-based approach to develop the models and also evaluated the SC performance by using six sigma metrics. Bullinger et al.,[13] have combined the top level measures and bottom level measures to develop a performance framework. Gunasekaran et al., [14] have developed a framework considering the four SC processes (plan, source, make, and deliver). Thakkar et al. [15] used the process-based approach to measure SC performance measures in the small and medium scale industries. Hierarchical models were developed by Askariazad and Wanous [16] to prioritize the performance measures in the context of SC. Misra and Sharma [17] have presented the relationship between the SC performance metrics and SC strategies. Moreover, they have developed a performance framework to evaluate the paint industry performance. Tavana et al., [18] have proposed an integrated model to measure the three echelon (Supplier- Manufacturer- Distributor) SC performance. Kanna Govindan et al.,[19] have developed a hybrid approach to evaluating the food industry SC performance by considering green performance measures. Abroon Qazi et al., [20] have used a utility based process approach to capture the interdependencies among risks, risk mitigation strategies and performance measures in an SC network. Venkatesh Mani et al., [21] have developed a framework to explore the social issues relevant to the suppliers and to recognize the performance measures in the emerging economies.

3.2. Perspective-based approaches

The perspective-based model was developed by Otto and Kotzab [22] in the year 2003. They have considered each perspective to provide the measures in the evaluation of perspective of the SC. This approach assembles the generic performance measures and also provides the interrelationship among the performance measures. Perspective has stated the vision of each researcher in the view of SC. Hence each perspective has its own view on SC problems, solutions and performance metrics. Therefore, there could be a trade-off between one perspective measures to another perspective measures. The authors have considered two main perspective models: Balanced Scorecard-based models and Supply chain operations reference based models.

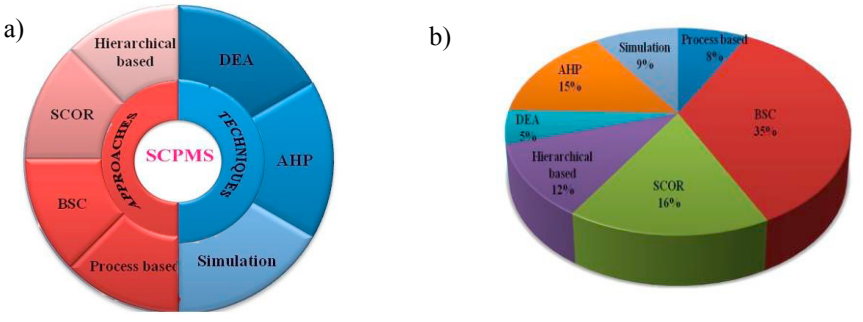

Fig.1. (a) Classification of SCPMS; (b) Distribution of papers based on SCPMS

3.2.1. Balanced Scorecard models (BSC)

Majority of the researchers (35%) have used the Balanced Scorecard (BSC) approach for evaluating the SC performance. Kaplan and Norton [23] have developed the BSC approach in 1992. The BSC approach is generally

applied to choose and combine the SC performance metrics from the balanced view. It underscored on balancing four classes, which are customers, financial, internal processes, and innovations. The BSC comprises traditional financial measures representing an organization's past and adds non-financial measures (operational measures) representing the drivers of future performance which have distributed between the four started classes. The fundamental quality of the BSC is that it measures the performance in all four main areas, which have associated with the strategic objectives. Apart from Kaplan et al.[23], few researchers [24] linked the SCM framework to the BSC to identify performance metrics of different companies in different parts of the World. The BSC has more commonly applied to both theories and practice with so many advantages over other models [25]. Chai et al., [26] have used this approach for the logistics industry to measure SC performance. Trivedi and Rajesh, [27] have used the BSC technique with the combination of AHP technique to evaluate the performance of the SC. G.F. Khanaposhtani et al., [28] have used a mixed approach consisting of BSC, Game theory and System Dynamics (SD) to evaluate the automobile industry performance. De Xia et al., [29] have developed a modified strategic balanced scorecard to evaluate the technology candidates in terms of their features of sustainability. More recently, Fana Rasolofo et al., [30] have analyzed the role of the BSC in the management of SC uncertainty in service activities. T. Shashank et al., [31] have proposed a BSC and strategy map-based quantitative framework for assessing the lean and green performance of the SC. Because of its simplistic nature, many authors have used the BSC approach Hoque and James [32]. However, the BSC approach limited to fewer measures only and it is complicated to measure integrated supply chain by using this approach [33].

3.2.2. Supply chain operations reference model(SCOR)

Subsequently, to the BSC approach, the Supply chain operations reference model (SCOR) has acquired more attention from the researchers. According to figure 2, 16 % of the papers have used the SCOR approach. The Supply chain council (SCC) developed the SCOR model in 1996, containing performance attributes and metrics depend on five different management processes (plan, source, make, deliver and return) [34]. Furthermore, SCOR contains thirteen metrics corresponding to level 1 which fall into five categories; SC reliability metrics, flexibility metrics, responsiveness metrics, cost metrics, and assets metrics. The first three categories have directly linked to the customers and hence called customer facing. The rest of the metrics, measurements within the internal operation of the SC and are named as internal facing. Many authors have used SCOR in the context of SCPM like; Wong et al., [35] have applied SCOR measures as input variables and output variables for DEA to evaluate the performance of the SC. Thakkar et al., [15] have mixed the features of the SCOR and BSC models to develop a PMS for the case of small and medium enterprises in India. Moreover, they have formulated a group of quantitative and qualitative data received from the research case study. Ghatari et al., [36] have expressed a PMS based on the SCOR for distributors in pharmaceutical supply chains. Essajide et al., [37] have presented an adaptation of the SCOR models to the pharmaceuticals wholesale distributors in the performance of SC. More recently, Raul Zuniga et al., [38] have used this SCOR model to identify the key performance measures to reduce the complexities of the SC.

3.3. Hierarchical based approaches

Hierarchical based models are useful to measure the performance of an SC at different hierarchical levels. Manager requires the right measures at right time to take the right decision at each level of the SC (strategic level, tactical level, and operational level). Almost 12% of the articles have used the Hierarchical based models to evaluate the SC performance. Gunasekaran et al. [39] have developed a framework with the strategic level metrics, tactical metrics, and operational level metrics. The main aim of their framework is to allocate the suitable metrics to the right management level. However, researchers and managers have to face a difficulty in the selection of proper metrics due to the large amount metrics have given in their framework. In another paper, Gunasekaran et al. [40] have prioritized the metrics based on the three-point score. Similarly, Bhagwat and Sharma [52] classified the metrics based on the three hierarchical levels. Moreover, they prioritize the metrics in the global competitive environment to take an appropriate decision by the managers. Pramod et al., [43] have developed a hierarchical based model to evaluate the performance of service SC in terms of safety, risk and health. P.K Dey et al. [44] have presented an empirical study to develop a hierarchical based performance measurement system in green SC.

4. Techniques

4.1. Analytic hierarchy process

Thomas developed the analytic hierarchy process (AHP) in the 1970s. This technique may be useful for analyzing and organizing complex decisions by considering mathematics and psychology. Even though it was developed in the 1970s, but it was applied in the SCM context in 2000s only. To make pairwise comparisons, a numerical weight was given to each element in the hierarchy. Dollinger et al., [45] have combined the AHP with the pre-emptive goal programming (PGP) model to find out the KPM to evaluate the SC performance. Wanous, [16] have applied the AHP for pairwise comparisons of critical SC functions to formulate a PMS to evaluate the complete performance of SCs. Charkha and Jaju [55], have integrated the AHP and Six Sigma to measure the SC performance of a textile industry in India. Li et al., [47] have formulated a logarithm triangular fuzzy number (LTFN)-AHP technique that explores the fuzzy environment to measure the SC performance. Govindan et al., [19] have used the fuzzy AHP to prioritize the indicators in improving SC performance of four Indian manufacturing companies. However, this AHP technique has gained less attention from the researchers. Rupesh Kumar and Surendra [48] have applied AHP and Fuzzy AHP to Indian sugar industry for identifying the information technology barriers which manipulate the sugar SC. V. G. Venkatesh et al., [21] have used the fuzzy AHP to prioritize the attributes in the selection of a suitable supplier partner in humanitarian SC.

4.2. Data envelopment analysis

Charnes et al. [49] have developed the data envelopment analysis (DEA) models. DEA models are helpful to measure the SC performance in terms of inputs and outputs by using the qualitative and quantitative measures. Wong and Wong [50] have used the DEA models to understand the effect of input variables like technical efficiency and cost efficiency on the output measures likeability of the firm and opportunity cost respectively. Galler et al., [51] have presented the application of DEA models in automobile industry SC. For the purpose of calculating the SC score, Shafiee et al. [52] have used DEA models in Iranian food industry. For the purpose of predicting group membership in the sustainable SC environment, Elahe Boudaghi et al. [53] have developed a new DEA - discriminate analysis (DEA-DA) model. More recently, Imre Dobos et al. [54] have used the DEA models in a selection of a green supplier. They have considered the green factors as output measures and management factors as input variables in the DEA model. H. Omrani et al. [55] have developed a relational network DEA model to evaluate the SC performance with fuzzy numbers.

4.3. Simulation

Measuring and setting benchmarks for various strategies in the multi-tier supply chain is highly complicated. Identifying the KPMs and linking them with the operational strategy in this dynamic nature is too difficult to do.[56]. Hence in this context simulation plays a vital role in evaluating the SC performance in dynamic nature. The inter-relationship among information sharing, total cost, and on-time delivery rates have been modeled through simulation technique by Hall, [66]. Chiu and Okudan [58] have applied the simulation-based methods in designing of additive manufacturing and SC context. Fan et al.,[59] have developed computer recycling model using system dynamic (SD) approach to understanding the status of the electronic waste in Taiwan. Also, they have tested the three decision variables (holding duration, recycling refund, and innovative technology). Langroodi and Amiri, [71] have used this approach to study the dynamic behavior of the SC in other regions concerning the order variability at a specific area. Li et al.,[61] have investigated a three-echelon closed loop SC consisting of Supplier, Manufacturer, and Retailer. Additionally, they have analyzed the impact of return yield, and recycling process lead time and product consumption lead time by considering the two KPIs like order rate and serviceable inventory. Qingqi Long [62] has used the Agent-based simulation (ABS) to evaluate the decision making approaches in a five echelon manufacturing SC.

5. Discussions

In this paper, the trends of studies in SCPMS have been studied along with 127 articles. The yearly distributions of the papers are presented in Fig 2. The academicians and researchers focus has been remarkably increased in performance measurement of the SCs from the year 2007 onwards. This means that researchers have paid more attention in recent years than previous years about the SCPMS. Since the identification of key operational metrics at each level of SC and linking them with the entire SC performance increase appreciably. Hence the trend of evaluating the SC performance is expected to continue in future.

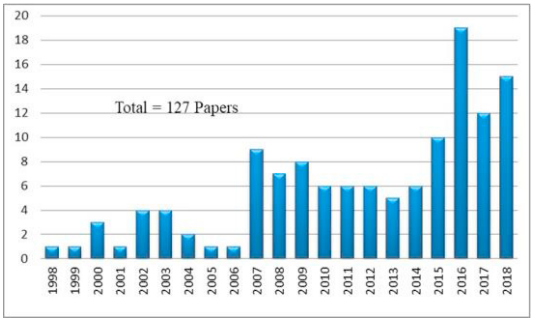

Fig.2 Yearly distribution of papers

The primary objective of this study is to identify the most popular performance measurement system in the context of SC for the last two decades. The most popular SCPMS is the BSC approach followed by SCOR, AHP, hierarchical - based approach, simulation techniques, process-based approach, and DEA. Initially, Majority of the researchers have focused on the identification of the performance measures. Later, that focus has shifted to the prioritizing the selected measures based on the nature of the metrics. According to the literature, it can be noted that these days, many researchers have used the SCPMS to evaluate the effect of operational metrics on the performance of entire SC. Based on the author's perspective, there is a need to group the widespread performance measures, because many researchers have developed the PMSs for their individual organizations. However, it is important for managers to understand that SC strategies are different from one company to another. Hence, SCPMS or a set of metrics are also not similar in all conditions. Hence, the following steps are recommended to the decision makers to identify the suitable SCPMS and right performance measures for their organizations:

- Identify the company SC strategy and objectives
- Identify the right performance measures and PMS based on the SC strategy and objectives
- Prioritize the selected measures with the focal SC strategy
- Inter-relate the key performance measures with the SC Strategy subsequent to discussions with the stakeholders
- Develop a suitable SCPMS and explain to the other members in the SC to evaluate the PMS.

6. Conclusion

This review analyzed the various approaches and techniques of performance measurement systems in the context of SC by reviewing the papers published in peer-reviewed journals using the Scopus and Google Scholar database from 1998 to 2018. The paper observed that for the last couple of decades, a considerable amount of work has been done in the context of SCPMS. The paper identified that development of the SCPMS based on the company SC strategy. It is observed that performance measurement in the context of SC is still a fruitful area to carry out the research in the future. The authors have noticed that additional research is required in the area of SC performance modeling using simulation techniques like system dynamics and discrete event simulation useful for SC which is operating in a volatile environment.

References

[1] A. Neely, J. Mills, K. Platts, H. Richards, M. Gregory, M. Kennerley, Performance measurement system design : developing and testing a process-based approach, International Journal of Operations & Production Management, 20 (2000) 1119–1145.
[2] A. Neely, M. Gregory, K. Platts, Performance measurement system design - A literature review and research agenda, Int. J. Oper. Prod. Manag. 15 (1995) 80–116.
[3] F.T.S.Chan, Performance Measurement in a Supply Chain, Int. J. Adv. Manuf. Technol. 21 (2003) 534–548.
[4] C. Shepherd, H. Günter, Measuring supply chain performance: current research and future directions, Int. J. Product. Perform. Manag. 55 (2006) 242–258.
[5] A. Gunasekaran, B. Kobu, Performance measures and metrics in logistics and supply chain management: a review of recent literature (1995–2004) for research and applications, Int. J. Prod. Res. 45 (2007) 2819–2840.
[6] G. Arzu Akyuz, T. Erman Erkan, Supply chain performance measurement: A literature review, Int. J. Prod. Res. 48 (2010) 5137–5155.
[7] R. Cuthbertson, W. Piotrowicz, Performance measurement systems in supply chains: A framework for contextual analysis, Int. J. Product. Perform. Manag. 60 (2011) 583–602.
[8] P.R.C.Gopal, J. Thakkar, A review on supply chain performance measures and metrics: 2000-2011, International Journal of Productivity and Performance Management. 61(2012) 518-547.
[9] A. Najmi, M.R. Gholamian, A. Makui, Supply chain performance models: A literature review on approaches, techniques, and criteria, J. Oper. Supply Chain Manag. 6 (2013) 94–113.
[10] H. Balfaqih, ZM Nopiah, Saibani N, Al-Nory MT. Review of supply chain performance measurement systems: 1998–2015. Computers in Industry82 (2016): 135-150.
[11] V. Maestrini, D. Luzzini, P. Maccarrone, F. Caniato, Supply chain performance measurement systems: A systematic review and research agenda, Int. J. Prod. Econ. 183 (2017) 299–315.
[12] K.K. Ross-Smith, M. Yearworth, Dynamics of operational procurement: systems modelling for performance tracking and auditing, 29th Int. Conf. Syst. Dyn. Soc. (2011) 1–22.
[13] H.-J. Bullinger, M. Kühner, A. Van Hoof, Analysing supply chain performance using a balanced measurement method, Int. J. Prod. Res. 40 (2002) 3533–3543.
[14] A. Gunasekaran, C. Patel, R.E. Mcgaughey, A framework for supply chain performance measurement, Int. J. Prod. Econ. 87 (2004) 333–347.
[15] J. Thakkar, A. Kanda, S.G. Deshmukh, Supply chain performance measurement framework for small and medium scale enterprises, Benchmarking An Int. J. 16 (2009) 702–723.
[16] M.A. Wanous, Mohammed, A proposed value model for prioritising supply chain performance measures, Int. J. Business Performance and Supply Chain Modelling, 1 (2009) 115–128.
[17] P. Mishra, R.K. Sharma, Benchmarking SCM performance and empirical analysis: A case from paint industry, Logist. Res. 7 (2014).
[18] S.A. Bagloee, M. Shnaiderman, M. Tavana, A. Ceder, A logic-based model for facility placement planning in supply chain management, Int. J. Logist. Syst. Manag. 20 (2015) 122.
[19] K. Govindan, S.K. Mangla, S. Luthra, The Management of Operations Prioritising indicators in improving supply chain performance using fuzzy AHP : insights from the case example of four Indian manufacturing companies, Prod. Plan. Control. 7287 (2017) 1–22.
[20] A. Qazi, A. Dickson, J. Quigley, B. Gaudenzi, Supply chain risk network management : A Bayesian belief network and expected utility based approach for managing supply chain risks, Int. J. Prod. Econ. 196 (2018) 24–42.
[21] V.G. Venkatesh, A. Zhang, E. Deakins, S. Luthra, S. Mangla, A fuzzy AHP-TOPSIS approach to supply partner selection in continuous aid humanitarian supply chains, Ann. Oper. Res. (2018).
[22] A. Otto, H. Kotzab, Does supply chain management really pay? Six perspectives to measure the performance of managing a supply chain, Eur. J. Oper. Res. 144 (2003) 306–320.
[23] R.S. Kaplan, D.P. Norton, The Balanced Scorecard – Measures that Drive Performance The Balanced Scorecard — Measures, Harward Bus. Reivew. (1992).
[24] M. Anand, B.S. Sahay, S. Saha, Balanced Scorecard in Indian Companies, Vikalpa. 30 (2005) 11–25.
[25] E.W. Davis, R.E. Spekman, The Extended Enterprise: Gaining Competitive Advantage Through Collaborative Supply Chains, Pearson education,(2004).
[26] J. Chai, J.N.K. Liu, E.W.T. Ngai, Application of decision-making techniques in supplier selection: A systematic review of literature, Expert Syst. Appl. 40 (2013) 3872–3885.
[27] A. Trivedi, K. Rajesh, A Framework for Performance Measurement in Supply Chain Using Balanced Score Card Method: A Case Study, Int. J. Recent Trends Mech. Eng. 1 (2013) 20–23.
[28] G.F. Khanaposhtani, S.S. Jafari, F. Ariana, Formulating the supply chain strategy of automotive industry in Iran using balanced Scorecard , System Dynamics , and Game Theory, Mark. Brand. Res. 4 (2017) 135–147.
[29] D. Xia, Q. Yu, Q. Gao, G. Cheng, Sustainable technology selection decision-making model for enterprise in supply chain : Based on a modi fi ed strategic balanced scorecard, J. Clean. Prod. 141 (2017) 1337–1348.
[30] F. Rasolofo-Distler, F. Distler, Using the balanced scorecard to manage service supply chain uncertainty: Case studies in French real estate services, Knowl. Process Manag. 25 (2018) 129–142.
[31] S. Thanki, J. Thakkar, A quantitative framework for lean and green assessment of supply chain performance, Int. J. Product. Perform. Manag. 67 (2018) 366–400.

[32] Z. Hoque, W. James, Linking Balanced Scorecard Measures to Size and Market Factors: Impact on Organizational Performance, J. Manag. Account. Res. 12 (2000) 1–17.
[33] P.C. Brewer, T.W. Speh, Using the balanced scorecard to measure supply chain performance, J. Bus. 21 (2000) 75–94.
[34] L.L.T. Li, An integrated framework for supply chain performance measurement using six-sigma metrics, (2010) 387–406.
[35] W.P. Wong, W. Peng Wong, K. Yew Wong, A review on benchmarking of supply chain performance measures, Benchmarking: An International Journal, 15 (2008) 25-51.
[36] A.R.. Ghatari, G.. Mehralian, F.. Zarenezhad, H.. Rasekh, Developing a model for agile supply: An empirical study from Iranian pharmaceutical supply chain, Iran. J. Pharm. Res. 12 (2013) 189–201.
[37] D. Essajide, L. Rachidi, Planning and modelling of Pharmaceuticals Wholesale-Distributors supply Chain using SCOR model : A Moroccan case study I ., Int. J. Manag. Sci. Bus. Res. 6 (2017) 35–51.
[38] J. Zuniga, R.; Icarte, G.; Griffiths, J.; Lopez, J; Quezada, Modeling of Critical Products Supply Chain Required to Affected People on Earthquakes and Tsunamis Through Use of SCOR Model, Dynamics Logist. Proc. 6th Int. Conf. LDIC. (2018) 55–58.
[39] A. Gunasekaran, C. Patel, E. Tirtiroglu, Performance measures and metrics in a supply chain environment, International Journal of Operations & Production Management, 21 (2001) 71-87.
[40] A. Gunasekaran, C. Patel, R.E. McGaughey, A framework for supply chain performance measurement, Int. J. Prod. Econ. 87 (2004) 333–347.
[41] R. Bhagwat, M.K. Sharma, Performance measurement of supply chain management using the analytical hierarchy process, Prod. Plan. Control. 18 (2007) 666–680.
[42] R. Bhagwat, M.K. Sharma, Performance measurement of supply chain management: A balanced scorecard approach, Comput. Ind. Eng. 53 (2007) 43–62.
[43] V.R. Pramod, D.K. Banwet, Performance measurement of SHER service supply chain: a balanced score card – ANP approach, Int. J. Bus. Excell. 4 (2011) 321.
[44] P.K. Dey, W. Cheffi, Green supply chain performance measurement using the analytic hierarchy process: a comparative analysis of manufacturing organisations, Prod. Plan. Control. 24 (2013) 702–720.
[45] Dollinger, S.J., Malmquist, D., Pearcy, D.H., Giunipero, L.C., Swafford, P.M., Ghosh, S., Murthy, N.N., Understanding supply chain management: critical research and a theoretical framework", International Journal of Production Economics. 1 (2009) 231–241.
[46] P.G. Charkha, S.B. Jaju, Supply chain performance measurement system : an overview, Int. J. Bus. Perform. Supply Chain Model. 6 (2014) 40–60.
[47] G. Li, H. Yang, L. Sun, A.S. Sohal, The impact of IT implementation on supply chain integration and performance, Int. J. Prod. Econ. 120 (2009) 125–138.
[48] R. Kumar, K. Surendra, Information technology barriers in Indian sugar supply chain : an AHP and fuzzy AHP approach, Benchmarking: An International Journal, 25(2018) 1978-1991.
[49] E.R. A. Charnes, W.W. Cooper, Measuring the efficiency of decision making units, 2 (1978) 429–444.
[50] W. Peng Wong, K. Yew Wong, Supply chain performance measurement system using DEA modeling, Ind. Manag. Data Syst. 107 (2007) 361–381.
[51] M. Shafiee, N. Shams-e-Alam, Supply Chain Performance Evaluation With Rough Data Envelopment Analysis, Bus. Econ. Res. 1 (2011) 57–61.
[52] D. Gallear, A. Ghobadian, Y. Li, N. Oregan, P. Childerhouse, M. Naim, An environmental uncertainty-based diagnostic reference tool for evaluating the performance of supply chain value streams, Prod. Plan. Control. 25 (2014) 1182–1197.
[53] E. Boudaghi, R. Farzipoor Saen, Developing a novel model of data envelopment analysis–discriminant analysis for predicting group membership of suppliers in sustainable supply chain, Comput. Oper. Res. 0 (2017) 1–12.
[54] I. Dobos, G. Vörösmarty, B. Magyar, T. Körútja, Inventory-related costs in green supplier selection problems with Data Envelopment Analysis (DEA), Int. J. Prod. Econ. (2018) 1–2.
[55] H. Omrani, M. Keshavarz, S.F. Ghaderi, Evaluation of supply chain of a shipping company in Iran by a fuzzy relational network data envelopment analysis model, Sci. Iran. 25 (2018) 868–890.
[56] M. Özbayrak, T.C. Papadopoulou, M. Akgun, Systems dynamics modelling of a manufacturing supply chain system, Simul. Model. Pract. Theory. 15 (2007) 1338–1355.
[57] Chopra Sunil, Peter Meindl, Supply chain management. Strategy, planning & operation, Das summa summarum des management, (2007) 265-275.
[58] M.C. Chiu, G. Okudan, An investigation on the impact of product modularity level on supply chain performance metrics: An industrial case study, J. Intell. Manuf. 25 (2014) 129–145.
[59] C. Fan, S.S.K.S. Fan, C.S. Wang, W.P. Tsai, Modeling computer recycling in Taiwan using system dynamics, Resour. Conserv. Recycl. 128 (2018) 167-175.
[60] R.R.P. Langroodi, M. Amiri, A system dynamics modeling approach for a multi-level, multi-product, multi-region supply chain under demand uncertainty, Expert Syst. Appl. 51 (2016) 231–244.
[61] S. Li, Y. He, L. Chen, Dynamic strategies for supply disruptions in production-inventory systems, Int. J. Prod. Econ. (2016) 1–14.
[62] Q. Long, Knowledge-Based Systems Data-driven decision making for supply chain networks with agent-based computational experiment, Knowledge-Based Syst. 141 (2018) 55–66.