

Financial performance measurement of supply chains: a review

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Abstract

Purpose – This study provides a systematic review on performance measurement of supply chains from a financial perspective.

Design/methodology/approach – This study systematically reviews the financial performance measures of supply chains. More specifically, this research reviews a total of 100 papers published in more than 50 peer-reviewed journals. The reviewed papers are categorized into three major areas of engineering, business and management. Additionally, the papers are investigated based on country, journal frequency, applied methods, publication date and research type (application or developmental).

Findings – According to the obtained results, cost, return on assets (ROA), sales, asset turnover, return on investment (ROI), market share, inventory turnover, profit margin, revenue growth, economic value added (EVA) and cash-to-cash cycle are the most common metrics of financial performance measurement. Next, a framework is developed based on different categories of performance measurement and decision levels of the supply chain. Finally, some research directions are suggested to be further investigated by other scholars.

Originality/value – Although available studies on supply chain performance measurement are very vast and comprehensive, the majority of the studies have neglected to highlight the importance of financial measures. In other words, with the advent of nonfinancial measures, however, the majority of supply chain managers still prefer to consider financial issues in their performance assessment process.

Keywords Financial performance measurement, Supply chain, Performance metrics, Review

Paper type Literature review

1. Introduction

Performance measurement is an important topic which should be considered in any supply chain (Rahiminezhad Galankashi and Helmi, 2016). Supply chain performance measurement is important as today's competition is no more between companies (Sahay, 2003). In other words, with the progress of competition in markets, supply chains are competing to satisfy customers and absorb a bigger portion of the available demand (Thirumalai and Sinha, 2005). Therefore, it is critical to improve the performance of whole supply chain instead of single components (Behrouzi and Wong, 2013).

Recent studies on supply chain performance measurement have highlighted the importance of considering nonfinancial metrics along with financial issues (Skrinjar *et al.*, 2008). However, although it is recommended to see both financial and nonfinancial measures using balanced approaches (Dossi and Patelli, 2010), this is not really happening in real world problems. This fact is more significant in majority of developing countries where financial perspectives are considered as market winners (Bascom, 2016). Therefore, although



performance measurement concept has been vastly investigated in previous studies (Taticchi *et al.*, 2015), only a very few research studies have been conducted on financial performance measurement of supply chains (Tangen, 2004). In other words, the majority of previous studies have discussed the necessity of shifting from “cost” to other metrics to assess the performance (Lawton and Solomko, 2005). However, they have neglected to concentrate on essential financial metrics which are necessary for financial performance measurement of supply chains (Neely *et al.*, 1997).

According to performance measurement concept, applying appropriate metrics is necessary to assess the performance (Galankashi *et al.*, 2018a, b). In this regard, developing, recognizing, quantifying and applying the appropriate and applicable measures to assess the performance of supply chains from financial perspective is essential to be more investigated (Ritchie and Kolodinsky, 2003). While there are numerous financial performance measures to be investigated in supply chains, they are mostly limited to cost in previous literature (Lawton and Solomko, 2005). In other words, previous studies on supply chain performance measurement have highlighted the importance of shifting from financial to nonfinancial performance assessment of supply chains (Hernaus *et al.*, 2012). However, these studies have neglected to discuss the specific measures of financial performance management and how they are different. In addition, according to previous studies, although the synchronizing and optimizing process of information and material flows have been significantly improved in previous literature (Lehmann, 2011), the elaboration of financial flows is not practically clarified by supply chain managers (Friemann *et al.*, 2012). This is mainly due to the inherent complexities linked with financial performance measures (Lu and Shang, 2017). Therefore, this study reviews the performance measurement of the supply chains from a financial perspective. The following research questions are addressed in this study:

- (1) What are the major measures of supply chain financial performance measurement?
- (2) What are the recent trends of supply chain financial performance measurement?

The remainder of this research is organized as follows. Section 2 develops the related literature on the topic. The research methodology is discussed in Section 3. Following, the classification of application area is discussed in Section 4. Next, the obtained results are discussed in Section 5. Finally, the concluding remarks and future research directions are discussed in Section 6.

2. Literature review

This section discusses related literature of the subject. The section has been divided to different related subsections as follows. The flowchart of the discussed literature is depicted in Figure 1 as follows.

2.1 General trends and issues in the supply chain

As a common accepted definition, a supply chain includes different components to convert raw materials to final products and deliver them to final customers (Chopra and Meindl, 2007). In this regard, there are different components (such as suppliers, manufacturers, distributors, retailers and customers) and flows (information, money and product) in any supply chain. Therefore, supply chain management (SCM) aims to consider and manage all these components and flows, concurrently (Chopra and Meindl, 2007). More related to research, there are many trends and issues in supply chains. Among these issues, supply chain performance measurement has achieved more attention from scholars in recent years (Gawankar *et al.*, 2020). Next, sections discuss this trend more specifically.

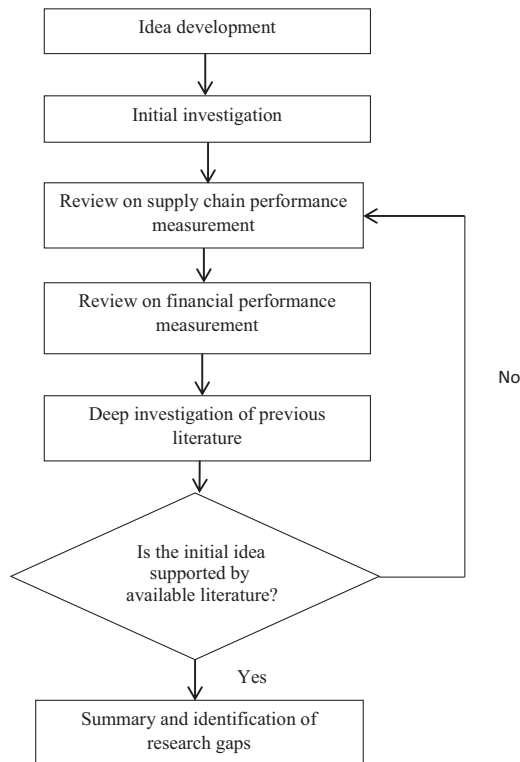


Figure 1.
Literature process

2.2 Supply chain performance measurement

With the advent of SCM and increasing demand for quality, fast deliveries and other important issues of today's competitive markets, supply chain performance measurement is a necessary consideration (Beamon, 1999). According to an old definition, performance measurement aims to identify and quantify the performance measures, indicators or metrics (Galankashi and Helmi, 2016). In other words, it aims to show the extent in which the desired goals of supply chains including quality, time, cost, etc. are achieved (Galankashi et al., 2019). Therefore, performance measurement is a useful approach as it can be applied to assess the achievement of supply chain components using different perspectives (Gabler, 2014). As a shorter definition, performance measurement describes the process of quantifying the effectiveness and efficiency of an action (Tangen, 2004). Following, a performance measure is defined as a metric which is applied to quantify the effectiveness and efficiency of an action (Galankashi et al., 2018a, b). Finally, performance measurement system is defined as a combination of different measures applied to quantify the effectiveness and efficiency of actions (Neely et al., 1995; Seiler, 2016).

Gunasekaran et al. (2001) proposed a comprehensive framework to assess strategic, tactical and operational performance of supply chains. Regarding strategic measures, this study suggested total cash flow time, customer query time, net profit vs productivity ratio, rate of return on investment, variations against budget, buyer-supplier partnership level and delivery performance to be applied for financial performance assessment of supply chains. Following, supplier cost-saving initiatives and delivery reliability are considered as tactical

measures of financial performance measurement. Finally, cost per operation hour, information carrying cost, total inventory and supplier rejection rate are considered as operational measures of financial performance assessment. According to previous studies, current literature shows a significant amount of works done on performance measurement (Maestrini *et al.*, 2017). However, although these efforts are really enormous and applicable to solve the related problems, big quantity of companies are still focusing on outdated performance metrics (Tangen, 2004). Furthermore, in spite of the fact that recent performance measurement frameworks include conceptual issues, they hardly provide practical and meaningful measures to managers (Tan and Sousa, 2019). In addition, previous literature shows that even the best approaches suggested to improve the performance of supply chains might not be as influential as what the researchers have highlighted in their research (Lockamy and McCormack, 2004). In other words, the majority of these studies assist managers in limited levels of decision levels (Kurien and Qureshi, 2011). There are many studies on supply chain performance measurement. According to Gunasekaran *et al.* (2004), there are many companies which have failed to maximize the potentialities of their supply chains. According to this research, this is mainly due to their failure to develop appropriate performance measures to integrate supply chain and maximize its effectiveness and efficiency. In addition, the concept of supply chain performance measurement has been successfully reviewed in previous studies. As an example, Gunasekaran and Kobu (2007) developed a review on performance measures and metrics in logistics and SCM. In another study, which is linked with SCM, Chan and Qi (2003a, b) proposed an innovative performance measurement approach to contribute in development of SCM. As it is clear, the majority of previous studies have focused on developing performance measurement framework. As another example, Shah and Singh (2001) developed the required performance measurement metrics to benchmark the performance of supply chains. In another similar study, Chan *et al.* (2003) developed a conceptual model to deliver essential support for performance enhancement of SCM.

As it is clear, there is a direct link between effectiveness, efficiency and performance measurement systems (Røge and Lennon, 2018). Therefore, it is necessary to define these terms. Shepherd and Günter (2011) define effectiveness as the wellness of satisfying customer's necessities. Following, this research defines efficiency as a measure to assess the economic allocation of resources considering pre-defined level of customer satisfaction. SCM and performance measurement are linked with each other. As the result, many companies apply continuous improvement tools to improve their competitive advantage by SCM. Table 1 tabulates a summary of discussed literature of this section.

2.3 Financial performance measurement

There are numerous advantages and limitations considered for a performance measurement system. However, for a company, financial performance measurement is very critical (Ritchie and Kolodinsky, 2003). In addition, applying a proper performance measurement system leads to an improved financial performance (Tangen, 2004). More about financial performance measurement, it is extensively recognized that financial performance of a company is significantly affected by performance of the supply chain (Shi and Yu, 2013). There are numerous challenges which are encountered by supply chain financial managers. These challenges include the application of technologies, approaches and the solutions applied to improve financial outputs (Johnson and Templar, 2007). Following discusses the previous studies on financial performance measurement.

The performance measurement process is initially started based on cost accounting (Agarwal and Taffler, 2008). During 1980s, it was common to compare obtained costs with the budgeted values to assess the performance of companies (Kaplan and Cooper, 1998). With the

Table 1.
Supply chain
performance
measurement

No	Author	Year	Developed approach
1	Beamon	1999	Summary and calculation of the performance measures applied in supply chains
2	Brewer and Speh	2000	Application of BSC in measuring the performance of supply chains
3	Gunasekaran <i>et al.</i>	2004	Framework development for supply chain performance measurement
4	Swinehart and Smith	2005	Continuous improvement via supply chain performance measurement
5	Wong and Wong	2007	Supply chain performance measurement using data envelopment analysis (DEA)
6	Aramyan	2007a, b	An integrated approach for supply chain performance measurement
7	Charan <i>et al.</i>	2008	Key performance indicators (KPIs) for supply chain performance measurement implementation
8	Thakkar <i>et al.</i>	2009	An integrated BSC-SCOR model for supply chain performance measurement of small and medium-sized enterprises (SMEs)
9	Shaw <i>et al.</i>	2010	An integrated environmental and classic supply chain performance measurement framework
10	Shepherd and Günter	2011	A systematic literature review on performance measurement of supply chains
11	Kurien and Qureshi	2011	A literature review on performance measurement of supply chains
12	Arif-Uz-Zaman and Ahsan	2014	Supply chain performance measurement from a lean perspective
13	Wibowo and Sholeh	2015	Supply chain performance measurement of construction projects
14	Dweekat <i>et al.</i>	2017	Application of Internet of things (IoT) in performance measurement of supply chains
15	Xie <i>et al.</i>	2020	Supply chain performance measurement in Industry 4.0 era

advent of technology and SCM concept, it was essential to consider other important financial data such as general profit orientation and return on investment (ROI) to enrich performance measurement systems (Phillips, 2012). According to Harrington (1991), it is impossible to manage what cannot be measured. Therefore, supply chain managers considered more systematic measures to assess financial performance of their supply chains.

Different dimensions of supply chain performance are investigated by Fitzgerald *et al.* (1991). This research applied profitability measures to assess asset turn over, liquidity measure to assess capital cost and labor and capital structure to assess profit per serve. Following, according to McMullan (1996), it is critical to apply a quantity of measures to assess SCM from a financial perspective. There are many measures suggested to assess the performance of supply chains from a financial perspective. For example, some studies have suggested considering ROI and ROE. In this regard, initial performance measures are mainly developed based on accounting systems (for example, return on sales (ROS), sales per employee, price variances, profit and productivity per unit production) (Ghalayini and Noble, 1996).

According to Bullinger *et al.* (2002), financial performance measurement is the basic necessity of companies' success. Many companies have developed different financial statements and reporting systems to assess their supply chain performance. However, these efforts seem to be not enough (Bullinger *et al.*, 2002). Different terms and definitions are linked with financial performance measurement. For example, a financial perspective of supply chain aims to confirm if a supply chain is competitive to address the necessities of customers (Hofmann, 2005). Similarly, financial measures determine the profitability and its growth rate for all entities of a supply chain (Kaplan, 1988). In addition, cost can be partially applied to

construct financial measures in order to assess the performance of supply chains. The components of the cost include total inventory costs, total logistics cost, cost of information technology and material acquisition costs (Berman and Wong, 2006).

There is a direct link between application of financial measures and implementation of supply chain strategies (SCSs). According to previous studies (Brewer, 2000; Kamau, 2014), financial measures confirm if the SCSs are successfully implemented. Similar to physical indicators, these measures use applied ratios of accounting and costing systems using monetary inputs and outputs. Therefore, achieving financial goals determines if the applied strategies, their execution and implementation are in line with supply chain profitability or not. These goals include profitability, maintaining liquidity, solvency, shareholders wealth maximization and sales turnover growth (Bhagwat and Sharma, 2007). In this regard, the profitability concept is achieved through a high quality financial performance measurement system (Bichou, 2006).

More related to financial performance measurement, it can be assessed by calculating total logistics costs (Engblom *et al.*, 2012). There are different flows within a supply chain, namely information, money and products (Chopra and Meindl, 2007). Therefore, it is very important to decide on different level of techniques and strategies contributing to these flows (Cavinato, 1992). As mentioned, many companies still prefer to apply financial measures to assess the performance of their supply chains (Kaplan and Cooper, 1998). As an example of previous literature, according to Friemann *et al.* (2012), there are many companies which are poorly prepared to cope with financial issues of supply chains including the working capital limitations. In this regard, it is emphasized to make links between operational and financial measures to decrease the quantity of employed capital (Simpson and Kohers, 2002). However, still, the performance measures of supply chain are not straightly linked with financial targets such as service level and capital cost (Gomm, 2010). According to Shi and Yu (2013), financial performance measures of SCM are classified into market-based and accounting-based categories. According to this study, return on assets (ROA), ROE, ROI, ROS, return on value added (ROVA), cost of goods sold (COGS), economic value added (EVA), cash flow margin, Altman Z-scores and overall financial index belong to accounting-based financial measures. Following, Tobin's q, Sharpe ratio and abnormal stock returns belong to market-based financial measures.

According to Jahera and Lloyd (1992), ROI is an applicable performance measure to be used in medium-sized companies. However, there are many criticisms on validity of ROI (Brainard and Tobin, 1968) as follows. First, the financial leverage of a company can influence its ROI and renders the comparative analysis of firms meaningless. Second, ROI ignores the investments' time value and the opportunity costs. Therefore, previous research studies have suggested using Tobin's q ratio to calculate the market value of a firm to its assets' replacement cost (Tobin, 1969; Tan *et al.*, 1999). Following, there are some studies which link the capabilities, logistics competencies and overall strategic performance of the companies by profit margin, ROI, ROA, general profitability and competitive position (Lynch *et al.*, 2000). Hence, the main concentration of previous studies is on financial measures. In this regard, there are many issues affecting financial performance of supply chains. According to Narasimhan and Das (2001), strategic purchasing provides added value to companies and can be a significant contributor of their performance. To be more specific, it can directly affect the financial performance of companies (Carr and Smeltzer, 1999; Carter and Narasimhan, 1996; Vickery *et al.*, 2003; Paulraj *et al.*, 2006).

The performance measurement framework of Morgan (2004) suggests dividend cover, creditor days, stock turnover, price-earnings (P/E) ratio, net asset turn over, ROE, ROCE, current ratio, ROS, sale/sq. m., gearing, ROA, gross profit and debtor days as financial measures of supply chain performance measurement. The previous literature has emphasized poor alignment of performance measures between financial and supply chain

issues (Gunasekaran *et al.*, 2001). According to Camerinelli and Cantu (2006), this is mainly due to separate processes of developing supply chain and its financial measures. In this regard, in some studies, financial performance measures are defined based on specific requirements of the supply chains. For example, Wu *et al.* (2006) definition of financial performance assessment includes ROI and cash flow from profitability and operations.

There is a straight connection among supply chain components and its performance (Galankashi and Helmi, 2017). To be more specific, it is possible for supply chain capabilities to enhance the financial performance of companies by providing cost advantages compared with their competitors. Furthermore, there are other issues affecting financial performance of the supply chains. As an example, it is discussed that information technology (IT) can enhance supply chain capabilities and improve financial performance of the companies (Wu *et al.*, 2006). Chan *et al.* (2006) provided a review study on performance measurement systems of SCM. Among different performance measures suggested in this research, financial measures include profitability, cash flow, ROI and overhead absorption. There is a direct relationship between total logistics cost of supply chain and their financial performance. According to Bhagwat and Sharma (2007), it is critical to decide on a wide range of techniques and strategies to provide a smooth flow of materials and information in a supply chain environment. These techniques are applied to investigate supply chain financial measures including ROI, total inventory cost and assets cost. Financial performance of supply chain is investigated in relation with different factors. For example, according to Christensen *et al.* (2007), financial performance of an organization is decreased as the variance of supply chain lead time increases. However, it is shown that the average lead time of a supply chain is not significantly affecting financial performance. There are other topics involved in financial performance measurement of supply chains. The BSC includes four major perspectives of financial, customer, internal business process and learning and growth. Sharma and Bhagwat (2007) proposed a balanced scorecard (BSC)-analytic hierarchy process (AHP) approach to assess the performance of supply chain. Regarding its financial perspective, this study developed customer query time, net profit vs productivity ratio, rate of ROI, variations against budget, buyer-supplier partnership level, delivery performance, supplier cost-saving initiatives, delivery reliability, cost per operation hour information carrying cost and supplier rejection rate to be used by supply chain managers. In another application of BSC in performance measurement of supply chains, Chia *et al.* (2009) include ROI, gross revenue, profit before tax and cost reduction in financial perspective of BSC.

Referring to Bhagwat and Sharma (2007), net profit vs productivity ratio, variations against budget, rate of ROI, buyer-supplier partnership level, supplier cost-saving initiatives, delivery performance, delivery reliability, cost per operation hour, supplier rejection rate and information carrying cost are the major measures for financial performance assessment of supply chains. Although it is critical to consider financial performance measures in supply chain performance measurement, it is also important to see the effect of supply chain on financial performance of companies (Shi and Yu, 2013). As an example, Johnson and Templar (2007) assessed the influence of supply chains on a company's financial performance. This research revealed that improving supply chain performance can statistically affect companies' financial performance. In another example, Dehning *et al.* (2007) considered straight influence of supply chain investments on financial performance measures and also the process metrics used to assess financial performance of supply chains.

Financial performance assessment of supply chains is directly affected by strategic alignment (Baier *et al.*, 2008). As an example, Baier *et al.* (2008) investigated strategic alignment, purchasing efficacy and performance. The obtained results showed that the alignment between business strategy, purchasing strategy and purchasing practices can improve financial performance of companies. The financial performance of supply chains are affected by numerous factors. These factors include IT, external relationships, sourcing

strategy and SC integration (Murray *et al.*, 1995). There are some studies on multivariate analysis of supply chain performance. For example, according to Green *et al.* (2006), logistics performance is significantly affected by SCM strategy. In addition, the SCM strategy and logistics performance positively affect marketing and consequently the financial performance. In another example, Aissa Fantazy *et al.* (2009) investigated flexibility and performance of the strategy in a supply chain context. According to this research, net profit performance (NPP) and sales growth performance (SGP) are two major dimensions of financial performance. Additionally, sales growth and profitability are two popular financial performance measures of industry. In a similar research, Kim (2009) assessed direct and indirect impact of supply chain integration on performance. Regarding financial measures, this study applied market share growth and total cost reduction to assess the performance of supply chain. As mentioned, many companies still focus on their financial concerns when measuring their performance (Altman, 2013). As a proof, Chia *et al.* (2009) investigated supply chain performance measurement practices and perception of managers. According to this research, although current studies suggest balanced approaches to assess performance, the majority of companies are still applying financial measures such as profit before tax, cost reduction and gross revenue to assess their performance. In a similar study supporting financial performance measures, Shi and Yu (2013) showed that both accounting and market-based financial performances are systematically linked in effective implementation of SCM. According to Randall and Theodore Farris (2009), financial techniques are applicable to enhance the performance and profitability of supply chains. Based on this research, financial techniques such as shared weighted average cost of capital and cash-to-cash cycle can decrease supply chain financial costs.

Recently, the focus of performance measures is changing from permanent supply chains to immediate supply chains. Therefore, in addition to common financial measures of ROI, internal rate of return (IRR), payback period and net value of the money, there should be additional measures to consider new concerns of supply chains (Bigliardi and Bottani, 2010). As supply chain gets bigger and more complex, its performance measurement also gets tougher. In this regard, Söderberg and Bengtsson (2010) investigated the relationship among SCM maturity and financial performance measurement in small and medium enterprises (SMEs). This research applied sales growth, cash flow, inventory turn, COGS, gross margin, operation margin, net margin, ROA and ROI to assess financial performance of supply chains. Although current literature advises to apply nonfinancial measures to assess the performance of supply chains (Matsoso and Benedict, 2014), however, recent studies show that application of financial measures is still significant. As a proof of this statement, according to Algren and Kotzab (2011), the average use of nonfinancial measures is 50% while the application of financial measures is 46% that is almost equal.

Johnson and Templar (2011) investigated the effect of supply chain on companies' performance by a unified proxy. Using a secondary financial data, this study demonstrated that the modification in proxy affects traditional financial measures of supply chain such as cash-to-cash cycle length. In a similar study, Shi and Yu (2013) showed both market-based financial performance and accounting are closely linked with SCM implementation. In addition to this research, there are some studies which are conducted in real world problems. In a study conducted in Colombian shipyard, Jaimes *et al.* (2011) provided the key performance measures of SCM. This study developed ROI, operational cost per hour, EVA, operating margin, total time investment flow, weighted average cost of capital, percentage of investment budget performance, level of environmental cost absorption and operating cost information as the major measures to assess the financial performance of supply chains. In another study highlighting the importance of financial measures, according to Mandal (2012), there is a weak connection between adopted strategies and the conducted actions. In other words, according to this research, companies are still concentrating on financial performance

measures. Consequently, making a reactive behavior, these companies face confusion as there are many measures to be considered for financial performance measurement. These measures include gross revenue, cost reduction and profit before tax. Poor linkages between financial measures and the operations of the supply chain are discussed in previous research. According to [Friemann *et al.* \(2012\)](#), majority of companies are still not ready to face financial issues such as capital limitation. Furthermore, according to this study, the applied measures of supply chain performance are not connected to financial goals such as cost of capital and desired service level. In addition, there should be an appropriate link among financial performance and supply chain fit. In this regard, according to [Wagner *et al.* \(2012\)](#), high value of supply chain fit leads companies to have a higher ROA. In addition, companies with negative misfit provide a poor performance comparing the companies with positive misfit.

Supply chain financial management optimizes its cash flow and financial structure ([Gomm, 2010](#)). This fact has been practiced in both manufacturing and service industries. According to [Cho *et al.* \(2012\)](#), by measuring ROI and the impact of the service delivery management policies, significant insights can be gained about financial health of service supply chains. This study developed some metrics for service supply chain performance evaluation. According to this study, range of services, buyer–supplier partnership level, service delivery, productivity, quality of supplier’s service level, total service delivery cost and rate of ROI are considered as the major strategic measures to assess the financial performance of service supply chains. Following, service capacity, supplier cost-saving initiatives and supplier pricing against market are introduced as the main measures of assessing financial performance of service supply chains from a tactical perspective. Finally, capacity utilization, operating ratio of actual to planned and average customer spend per visit per store are operational measures of assessing financial performance of service supply chains ([Cho *et al.*, 2012](#)).

Supply chain performance and applied financial strategy of companies should be linked. In addition, companies’ daily activities affect their financial performance ([Elgazzar *et al.*, 2011](#)). In another study, [Yu *et al.* \(2013\)](#) applied five perceptual measures, including growth in sales, growth in profit, growth in market share, ROI and growth to assess financial performance of supply. In a recent study, according to [Jin *et al.* \(2017\)](#), although SC managers aim to attain defined outputs of financial performance measurement, they are more interested in short-term financial outputs such as overall cost and obtained profit. The majority of previous studies on performance measurement have emphasized the statement of “the less is better.” In other words, supply chain managers should focus on small list of measures which are more critical for their customer service, operations management and also financial viability (FV) ([Chae, 2009](#)). As another example of recent studies, [Ahmad and Zabri \(2018\)](#) assumed variances of material, cost of goods sold, total cash flow time, operation cost per hour, costs related to supply chain, return on supply chain fixed asset and rate of ROI as the main components of financial viability (FV). A summary of the discussed literature of this section is tabulated in [Table 2](#).

In addition to above-mentioned studies, discussions on supply chain financial performance models and metrics (e.g. supply chain operations reference (SCOR) model, SCOR key performance indicators (KPIs), financial metrics used in different studies) should be more discussed. Regarding different financial performance measures applied in previous studies, next sections have comprehensively discussed these metrics as tabulated in [Table 5](#). However, more related to financial performance measurement, the SCOR model has been successfully linked with the topic. [Kasi \(2005\)](#) developed a study to investigate the application of SCOR model for supply chain modeling. According to this study, the SCOR model helps SCOR team to understand companies’ requirements and plan for them. In a review study, [Ntabe *et al.* \(2015\)](#) developed a systematic literature review to investigate different application of SCOR model in supply chains. More related to financial issues, the SCOR model can be

No	Author	Year	Developed measures
1	Barker	1995	An investigation on financial performance measurement
2	Ritchie and Kolodinsky	2003	An investigation on old and new financial performance measures
3	Ittner <i>et al.</i>	2003	Strategic performance measurement in financial service firms
4	Davis and Albright	2004	An investigation on BSC implementation and financial performance measurement
5	Škrinjar <i>et al.</i>	2008	A study on business performance, financial and nonfinancial performance measurement
6	Fullerton and Wempe	2009	An investigation on lean manufacturing (LM), financial and nonfinancial performance measurement
7	Jansen <i>et al.</i>	2009	A comparative study on financial performance measurement approaches of two countries
8	Dossi and Patelli	2010	Financial and nonfinancial performance measurement in international firms
9	Hernaus <i>et al.</i>	2012	An investigation of relationship between business process management and financial performance
10	Turley <i>et al.</i>	2015	An approach to assess the financial performance of governments
11	Jakub <i>et al.</i>	2015	The relation between economic value added (EVA) and financial performance
12	Ahmad and Zabri	2016	Performance measurement in manufacturing companies
13	Galant and Cadez	2017	A study on corporate social responsibility and financial performance
14	Jordão and Almeida	2017	An investigation on financial sustainability
15	Sroufe and Gopalakrishna-Remani	2019	An empirical examination of financial supply chain
16	Nasiri <i>et al.</i>	2020	Financial performance measurement and digital capabilities of supply chain

Table 2.
Financial performance
measurement

properly applied in financial performance measurement. However, this study showed that it can be applied in environmental topics. Similarly, according to Reichardt and Nichols (2003), the SCOR model is applicable in financial performance measurement (Hwang *et al.*, 2008). According to previous literature, simulation can be linked with performance measurement (Galankashi *et al.*, 2016, 2018a). Similarly, the SCOR model has been successfully integrated with simulation models. As an example, Persson and Araldi (2009) developed an integrated SCOR-simulation model for supply chain performance measurement. According to this study, stochastic demands can affect financial performance. In another study on SCOR model, Wang *et al.* (2010) suggested to consider both financial and nonfinancial metrics in addition to basic measures of SCOR model. Hwang *et al.* (2010) suggested to link SCOR model with performance of manufacturing companies. In this regard, this study integrated green purchasing, performance measurement and SCOR model. According to Li *et al.* (2017), previous literature on supply chain performance measurement has focused on cost. However, according to this study, financial performance measurement of supply chain should be enriched with more measures except cost.

Kocaoglu *et al.* (2013) developed a SCOR model to measure the performance of supply chains. According to this study, the developed financial performance measures should be classified in strategic, tactical and operational perspectives. Though, the findings of this research can justify one of the outputs of our research tabulated in Table 10. In another study, Hwang *et al.* (2014) showed that financial performance measures are important as they are frequently investigated by top management of the companies. As discussed, the SCOR model has been linked with both financial and other categories of performance. As another example, Tipayawong *et al.* (2015) showed how green performance and application of SCOR model

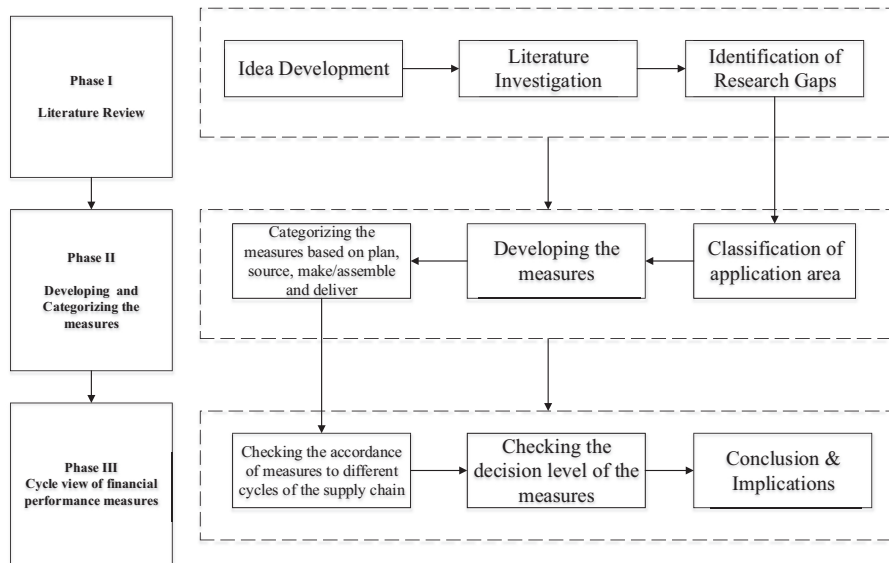
can positively affect financial performance of companies. In addition to supply chain, financial performance measurement has been frequently considered in supplier assessment process (Almasi *et al.*, 2019; Khoshfetrat *et al.*, 2020). More related to SCOR model, Lima-Junior and Carpinetti (2016) developed an integrated SCOR-Fuzzy Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) model for supplier assessment process. Regarding financial considerations, according to this study, financial capability, strength and position have been frequently applied in previous studies. As it is clear, the SCOR model has been vastly applied in performance measurement of supply chains. As another example, Dissanayake and Cross (2018) showed that there is a direct relationship between overall supply chain performance (SCP) and its required measures. In a recent review study on SCOR model, Chehbi-gamoura *et al.* (2019) showed that the performance of big data analytics can be investigated using SCOR model. In addition to SCOR model, many other approaches have been integrated with financial measures to assess financial performance of supply chains. Among these approaches, the data envelopment analysis (DEA) has been more frequently applied in performance measurement of supply chains (Wong and Wong, 2007). However, as the DEA model needs different inputs and outputs, the majority of previous studies have considered financial performance as a contributor to overall performance of supply chains (Haghighi *et al.*, 2016).

2.4 Research gap

In summary, according to discussed literature, a comprehensive review on financial performance measurement of supply chains is not developed yet. The necessity of conducting this study is more significant with regard to the growing obligation of assessing the performance of supply chains from a financial perspective (Li *et al.*, 2017). In addition, as discussed, the majority of previous studies have advised to transfer from financial to nonfinancial measures (Arnold, 2008) but neglected to provide a comprehensive overview on applicable financial measures of supply chains. In addition, these studies have neglected to specify the differences of cost (as the common understanding of managers from financial performance measures) and specific measures of financial performance assessment (Lord *et al.*, 2013). Finally, conducting review studies provide potential areas to be developed in future research. Therefore, in summary, a deep review on financial performance measures of supply chains is not developed yet, especially in developing countries. As discussed, there are numerous financial performance measures available in the literature. However, it is not possible for a supply chain to apply them concurrently. This is mainly due to the fact that applying all these measures impose extra cost to supply chains. In addition, many of these measures have a similar function. In this regard, to fill the gap of previous studies, this study reviews the performance measurement of the supply chains from a financial perspective. By doing this, this research enhances the general knowledge of researchers, managers and practitioners on financial performance measures of supply chains.

3. Research methodology

This section discusses the developed research methodology. As shown in Figure 2, the study has been divided into three phases to answer the research questions. Following provides a comprehensive discussion to achieve each research question. The scope of this research is limited to financial performance measurement of supply chains. To cover this scope, this study reviews different studies from 1980 to 2020 from different journals. Academic databases such as Science Direct, Emerald Insights, Springer, Taylor and Francis, Wiley, IEEEExplore, etc. are applied to search the papers. The distribution of articles with regard to journals is depicted in Figure 3. Other information such as field of category is presented in Section 4.

**Figure 2.**
Research framework

Phase I: Literature review

This phase provides a justification to conduct the research. As discussed, the initial phase of any performance measurement process is to investigate the financial perspective. The previous literature on the topic was carefully investigated to determine the potential gaps of the research. As an important output of this phase, although previous studies have highlighted the necessity of shifting from financial to nonfinancial measures, this is not really happening in real world problems. In other words, especially in developing countries, the companies still prefer to focus more on financial measures. In addition, almost all previous studies have interpreted cost as the main measure of financial performance measurement which should be seen beside other metrics. However, as the quantity of financial performance measures is very vast, a study should be conducted to categorize these measures based on major perspectives of performance measurement systems including plan, source, make/assemble and deliver.

Phase II: To find and categorize financial performance measures of supply chains based on plan, source, make/assemble and deliver perspectives

As a common issue of performance measurement topic, there are many measures which can be applied to assess the performance of supply chains. This issue applies for financial measures also. According to previous studies on performance measurement topic, using less but efficient measures is preferred to assess the performance of supply chains. In other words, the availability of different measures to assess the performance of supply chains is the main challenge of managers, researchers and practitioners to choose fit measure among them. In addition, over processing is a kind of waste which should be avoided. Therefore, as the majority of applied measures might have a very similar application in financial performance assessment, their concurrent application imposes extra costs to supply chains and waste the

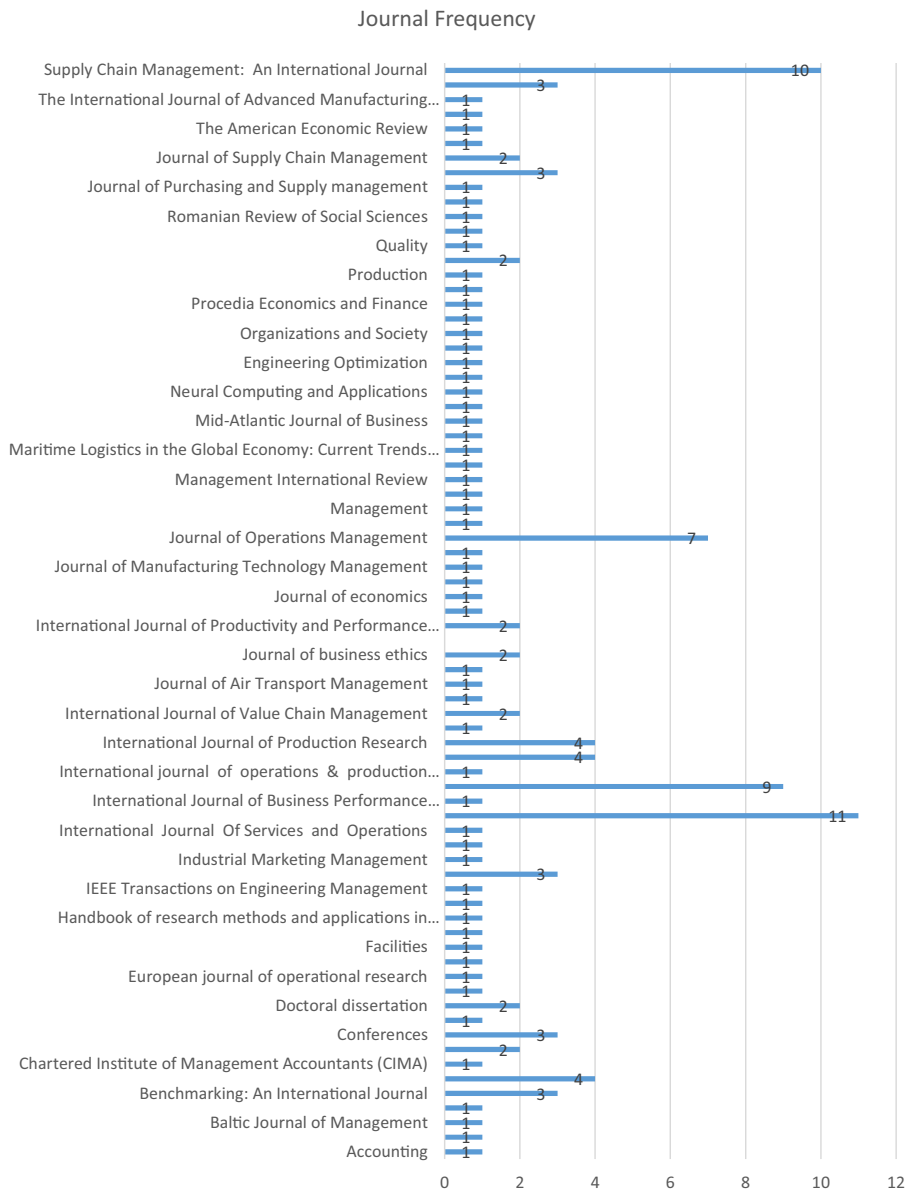


Figure 3.
Journal frequency

time also. So, this phase aims to find the most important financial performance measures of supply chains and categorize them based on plan, source, make/assemble and deliver perspectives.

Phase III: To categorize the financial performance of supply chain based on cycle view of supply chains

Based on [Chopra and Meindl \(2007\)](#), supply chain processes are separated in an order of connected cycles. These cycles are completed at the interactions among two consecutive supply chain stages. This phase aims to categorize the financial performance of supply chain to procurement cycle, manufacturing cycle, replenishment cycle and customer order cycle. Following, these activities are also categorized based on strategic, tactical and operational decisions of supply chain. By doing this, this phase finalizes the proposed framework of this research to assess the performance of supply chains from a financial perspective.

4. Results

This section provides a classified output of the conducted review on recent studies of supply chain financial performance measurement. The classification process includes the investigation of related studies based on their field category (engineering, business and management), developed measures, research type, publication country, date and publishers.

4.1 *Field of category*

As mentioned, the investigated studies are classified based on their field of category. In other words, these studies are more investigated to be classified in engineering or business and management categories.

4.1.1 Engineering category. This section classifies investigated studies based on their application in engineering categories, applied tools and consideration of case study. As tabulated in [Table 3](#), the majority of previous studies have been completed in manufacturing industry. In addition, there are some studies in information, purchasing, agrifood and retail companies. Regarding the applied tools, the majority of these studies have been conducted by statistical hypothesis testing. However, there are some studies where the literature survey or systematic reviews have been applied to assess financial performance of supply chains. Finally, regarding the case studies, different manufacturing companies in different countries have been investigated to apply the developed approaches in real world problems.

4.1.2 Business and management category. This section classifies the investigated studies based on their application in business and management category, applied tools and application in case study. According to [Table 4](#), there are different areas of business and management which are considered in previous studies. These areas include logistics, SCM, global markets, etc. as shown in fourth column of [Table 4](#). In addition, different approaches are applied to assess the financial performance of these areas. These tools vary from the qualitative approaches such as BSC to quantitative methodologies including AHP. Finally, the considered case studies belong to both manufacturing and service industries of different countries.

4.2 *Developed measures*

As an important output of this research, this section provides financial measures to be applied in supply chain performance measurement. As tabulated in [Table 5](#), there are numerous measures applied to assess financial performance of supply chains. The majority of the applied measures are displayed in [Table 5](#). As some of these measures are only applied, and the rest have been developed by researchers, next section classifies the considered studies based on the application or development of financial performance measures.

4.3 *Research type (application or developmental)*

As mentioned above, the conducted studies are investigated based on application of current or development of new measures to assess financial performance of supply chains. According

No	Author	Year	Area of engineering	Applied tools	Case study
1	Medori and Steeple	2000	Manufacturing	Literature review	Three medium- to large sized-manufacturing companies
2	Bourne <i>et al.</i>	2000	Manufacturing	Theory-based development	Three longitudinal case studies
3	Chan and Qi	2003a, b	Network design	Process based approach	Inventory management process
4	Chen <i>et al.</i>	2004	Strategic purchasing	Manufacturing	221 United States manufacturing firms
5	Wu <i>et al.</i>	2006	Information technology	Statistical hypothesis testing	Council of Supply Chain Management Professionals (CSCMP)
6	Aramyan <i>et al.</i>	2007a, b	Agri-food supply chains	Case study approach	Dutch-German tomato supply chain
7	Fawcett <i>et al.</i>	2009	Information technology	large-scale survey and semi-structured interviews	Institute for Supply Management, American Production and Inventory Control Society (APICS), and the Council of Supply Chain Management Professionals
8	Bhagwat and Sharma	2007	Manufacturing	BSC	Indian SMEs
9	Dehning	2007	Manufacturing	Statistical hypothesis testing	123 manufacturing firms
10	Christensen <i>et al.</i>	2007	Manufacturing	Statistical hypothesis testing	402 firms from the list of Institute of Supply Management
11	Cai	2009	Retail companies	Systematic approach	A large retail company
12	Kim	2009	Manufacturing	LISREL analysis	Korean and Japanese manufacturing firms
13	Abdolgheasemi Kordestani and Farhat	2009	Manufacturing	Hypothetical model	Swedish SMEs
14	Hofmann and Locker	2009	Manufacturing	EVA	A case study from Packaging industry
15	Saranga and Moser	2010	Production, manufacturing and logistics	Data Envelopment Analysis (DEA)	129 companies with more than USD 3 billion revenue
16	Gomm	2010	Financial engineering	Supply Chain Finance (SCF)	Chip industry
17	Jaimes <i>et al.</i>	2011	shipbuilding industry	BSC	Decentralized environments, Cartagena, Colombia
18	Banomyong and Supatn	2011	Manufacturing	Extensive literature review	Thailand SMEs
19	Elgazzar <i>et al.</i>	2012	Financial engineering	Dempster Shafer/ AHP	Numerical example
20	Ahmad and Zabri	2018	Manufacturing	Statistical hypothesis testing	Malaysian manufacturer

Table 3.
Engineering category

No	Author	Year	Area of business and management category	Applied tools	Case study
1	Lambert and Burdugroglu	2000	Value of Logistics	Various value measuring methods	Profit Impact of Marketing Strategy (PIMS) database
2	Bullinger <i>et al.</i>	2002	Bottom-up and top-down performance measures	BSC	Corresponding cost producing units
3	Otley	2002	Accounting	Accounting ratios	50 years overview on accounting
4	Morgan	2004	Organizational analysis	Literature based approach	Intra-organization scenarios of performance measurement
5	Paulraj <i>et al.</i>	2006	Strategic purchasing	Statistical hypothesis testing	Institute for Supply Management (ISM)
6	Rai <i>et al.</i>	2006	Supply chain integration	IT	Senior middle managers from attendees of the annual conference of the Council of Logistics Management (CLM)
7	Johnson and Templar	2007	SCM	Financial proxy	UK publicly limited companies with turnovers greater than £15m per annum
8	Bhagwat and Sharma	2007	Complex and volatile global decision environment	AHP	Operational SMEs of western India
9	Lenny Koh <i>et al.</i>	2007	Organizational performance	Exploratory Factor Analysis (EFA)	203 SMEs in Turkey
10	Fabbe-Costes and Jahre	2008	Supply chain integration	Systematic review	38 papers published in nine important journals
11	Charan <i>et al.</i>	2008	Supply chain performance measurement system implementation	Structural Self-Interaction Matrix (SSIM)	Indian automotive sector
12	Field and Meile	2008	Services context	Statistical hypothesis testing	Random sample of 350 professionals in the financial services industry
13	Aissa Fantazy <i>et al.</i>	2009	Strategy and flexibility	Statistical hypothesis testing	175 small and medium-sized Canadian manufacturing companies
14	Chia <i>et al.</i>	2009	Survey approach	BSC	Senior executives
15	Ou <i>et al.</i>	2010	External customer-firm-supplier relation management	Structural model	Information-related industries in Taiwan
16	Papakiriakopoulos and Pramatar	2010	Supply chain collaboration	Empirical research	Existing collaboration network comprising major product suppliers and a retail chain
17	Yu <i>et al.</i>	2013	Organizational learning perspective	Survey data	214 manufacturing firms in China

Table 4.
Business and
(continued) management category

Table 4.

No	Author	Year	Area of business and management category	Applied tools	Case study
18	Estampe <i>et al.</i>	2013	Performance evaluation models	Systematic literature review	Different models applied to evaluate the supply chains
19	Karl <i>et al.</i>	2018	Supply chain resilience	Systematic literature review	57 peer-reviewed academic papers from 2000 to 2017
20	Lee and Wong	2019	Intellectual Capital (IC)	Literature review	53 research papers from high-ranking journals

to [Table 6](#), previous studies have equally applied or developed financial measures to assess the performance of supply chains.

4.4 Publication country

[Table 7](#) classifies the investigated studies based on publication country. As shown in [Table 7](#), the developed countries have provided more studies in comparison with developing countries.

4.5 Graph of publication date

[Figure 4](#) shows the investigated studies based on publication data. This graph highlights the frequency of published papers in each year. As it is shown, previous literature includes the highest quantity of published works in 2007. In addition, according to this figure, year 1997 includes the least quantity of published studies.

4.6 Publishers

Another investigated area of this research is the publishers who have significantly concentrated on financial performance assessment of supply chain. As shown in [Figure 5](#), the Emerald and Elsevier are the most famously known publishers of this area. These two publishers are followed by Taylor and Francis, Springer and Inderscience, respectively.

5. Discussion

According to [Table 5](#), there are numerous measures which are applied to assess the financial performance of supply chains. However, there are many frequent measures which are applied in numerous studies. [Table 8](#) is structured to tabulate the frequency of the applied measures. According to this table, cost is the most common applied measure of financial performance measurement. As discussed, the performance measurement theory aims to apply less but efficient measures to assess the performance. In this regard, the most common measures, namely cost, ROA, sales, asset turnover, ROI, market share, inventory turnover, profit margin, revenue growth, EVA and cash-to-cash cycle time are applied to develop the final framework of this study.

5.1 Developed framework

[Table 9](#) classifies major applied measures of performance measurement based on plan, source, make/assemble and delivery categories. In other words, this table shows how these measures are categorized based on different processes of performance measurement.

No	Author	Year	Developed measures
1	Ellinger <i>et al.</i>	2002	(1) ROE (2) ROA (3) Tobin's q (4) Market Value Added (MVA)
2	Vickery <i>et al.</i>	2003	(1) ROA (2) ROI (3) ROS (4) Market share
3	Supply Chain 2020 Project Working Paper	2005	(1) Market share (2) ROA (3) Market share growth (4) ROA growth (5) Sales growth
4	Rai <i>et al.</i>	2006	(1) Financial flow integration (2) Revenue growth
5	Christensen <i>et al.</i>	2007	(1) Supply chain lead-time averages (2) Supply chain lead-time variability
6	Johnson and Templar	2007	(1) Sales (2) Operating costs (3) Fixed assets (4) Current assets (5) Cash-to-cash cycle
7	Dehning <i>et al.</i>	2007	(1) Gross margin (2) Raw materials inventory turnover (3) Asset turnover (4) Work-in-process inventory turnover (5) Market share (6) Finished goods inventory turnover (7) Total inventory turnover (8) ROA (9) ROS
8	Bhagwat and Sharma	2007	(1) Net profit vs. productivity ratio (2) Rate of return on investment (3) Variations against budget (4) Buyer-supplier partnership level (5) Delivery performance (6) Supplier cost saving initiatives (7) Delivery reliability (8) Cost per operation hour (9) Information carrying cost (10) Supplier rejection rate
9	Sharma and Bhagwat	2007	(1) Customer query time (2) Net profit vs productivity ratio (3) Rate of return on investment (4) Variations against budget (5) Buyer-supplier partnership level (6) Delivery performance (7) Supplier cost saving initiatives (8) Delivery reliability (9) Cost per operation hour (10) Information carrying cost (11) Supplier rejection rate

(continued)

Table 5.
Applied measures

No	Author	Year	Developed measures
10	Field and Meile	2008	(1) Financial planning (2) Introducing long care issues into financial plan
11	Hofmann and Locker	2009	(1) EVA (2) MVA (3) Discounted cash flow (DCF)
12	Randall and Theodore Farris	2009	(1) Cash-to-cash variables (2) Weighted Average Cost of Capital (WACC) (3) Gross profit margin (4) Selling price (per unit) (5) Units per year (6) Purchases (7) Sales revenue (8) Accounts payable (9) Accounts receivable
13	Gomm	2010	(1) Fixed asset financing (2) Cost of capital (3) Working capital management
14	Elgazzar <i>et al.</i>	2011	(1) Cost (2) Revenue (3) Asset utilizations
15	Elgazzar <i>et al.</i>	2012	(1) EVA components (2) Du Pont analysis (3) Revenue (4) Profitability and efficiency factor (5) Cost (6) Asset
16	Shi and Yu	2013	(1) ROA (2) ROE (3) ROI (4) Profit margin (5) COGS (6) EVA
17	Wagner <i>et al.</i>	2012	(1) ROA
18	Yu <i>et al.</i>	2013	(1) Growth in sales (2) Growth in profit (3) Growth in market share (4) Return on investment (5) Growth in ROI
19	Friemann <i>et al.</i>	2012	(1) Cost of capital (2) Working capital (3) Cash-to-cash cycle
20	Jin <i>et al.</i>	2017	(1) Liquidity ratios (2) Asset management ratios (3) Debt management ratios (4) Profitability ratios

Table 5.

5.2 Cycle view of the developed framework

According to Chopra and Meindl (2000), there are four linked cycles in supply chains, namely procurement cycle, manufacturing cycle, replenishment cycle and customer order cycle. Table 10 develops financial measures of each cycle. In addition, it shows how these measures belong to strategic, tactical and operational decisions of supply chains.

					Financial performance measurement of supply chains
No	Author	Year	Application	Developmental	
1	Ellinger <i>et al.</i>	2002	✓		1693
2	Vickery <i>et al.</i>	2003	✓		
3	Supply Chain 2020 Project Working Paper	2005		✓	
4	Rai <i>et al.</i>	2006	✓		
5	Christensen <i>et al.</i>	2007	✓		
6	Johnson and Templar	2007		✓	
7	Dehning <i>et al.</i>	2007		✓	
8	Bhagwat and Sharma	2007		✓	
9	Sharma and Bhagwat	2007		✓	
10	Field and Meile	2008	✓		
11	Hofmann and Locker	2009		✓	
12	Randall and Farris II	2009		✓	
13	Gomm	2010	✓		
14	Elgazzar <i>et al.</i>	2011		✓	
15	Elgazzar <i>et al.</i>	2012		✓	
16	Shi and Yu	2013		✓	
17	Wagner <i>et al.</i>	2012	✓		
18	Yu <i>et al.</i>	2013	✓		
19	Friemann <i>et al.</i>	2012	✓		
20	Jin <i>et al.</i>	2017	✓		

Table 6.
Research type
(application or
developmental)

No	Country	Frequency	No	Country	Frequency
1	USA	43	23	Brazil	2
2	UK	22	24	Finland	2
3	India	14	25	Hong Kong	2
4	Germany	5	26	Poland	1
5	Netherlands	5	27	South Africa	1
6	Canada	4	28	Indonesia	1
7	Switzerland	4	29	Colombia	1
8	South Korea	4	30	Singapore	1
9	China	3	31	Serbia	1
10	Taiwan	3	32	Denmark	1
11	Australia	3	33	Norway	1
12	Sweden	3	34	Greece	1
13	Egypt	3	35	Philippines	1
14	Iran	2	36	Turkey	1
15	France	2			

Table 7.
Publication country

5.3 Model implementation

As discussed above, different tables are tabulated to show the applicability of the developed financial performance measures. In summary, [Tables 8, 9](#) and [10](#) showed the frequency of applied measures, the developed framework and cycle view of the developed framework, respectively. Therefore, the outputs of this research are already converted to a conceptual model. However, [Figure 6](#) is suggested to apply the developed framework in real world problems.

6. Concluding remarks

This research developed a systematic literature review on financial performance measures of supply chains. In this regard, there are some contributions linked with this research. As

Figure 4.
Research frequency
(1991–2020)

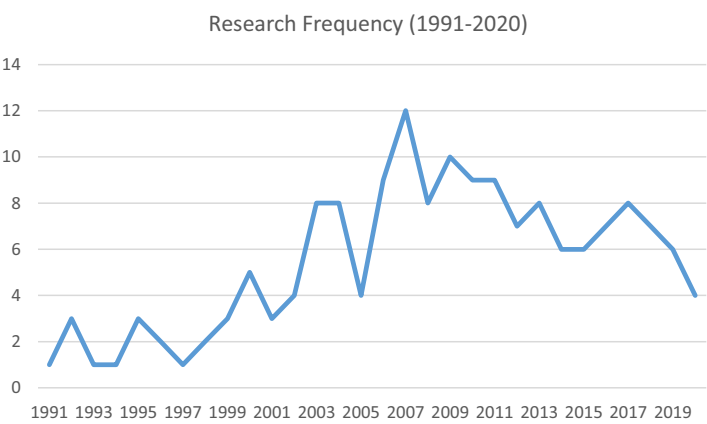
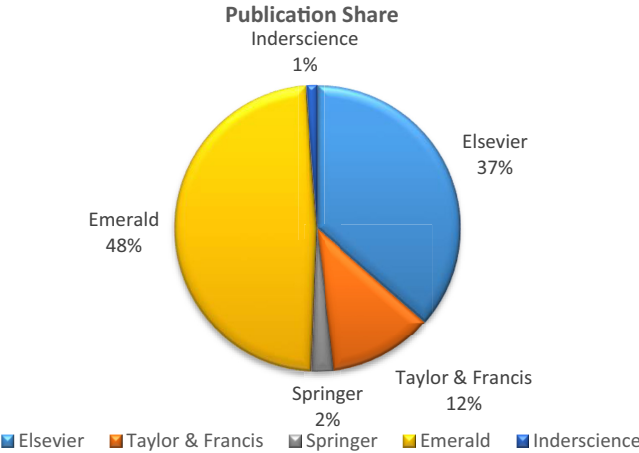


Figure 5.
Publication share



an academic contribution, the idea, methodology and the developed literature review assist researchers and managers to be more aware of different performance measures to be applied in financial performance measurement of supply chains. In other words, the output of this research can be applied as a summary of numerous previous studies on the topic. In addition, as a practical contribution, managers and practitioners can apply the summarized financial performance measures of this research to investigate their companies from a financial perspective. Next, as a social contribution, as applying less but fit measures can save the time and cost of performance measurement, proper application of the developed measures of this research can assist companies to save their cost and time. Finally, as a policy implication, as tabulated in [Table 10](#), the developed financial performance measures of the supply chain can be applied in different levels of decision making. To be more specific, the developed financial measures are applicable to be used by managers in different circumstances. According to [Chopra and Meindl \(2007\)](#), different decision levels of a supply chain affect its performance. In this regard, it is necessary to measure the output of

						Financial performance measurement of supply chains
No	Measure	Frequency	No	Measure	Frequency	
1	Cost	8	23	Buyer–supplier partnership level	2	1695
2	ROA	7	24	WACC	1	
3	Sales	6	25	Variations against budget	1	
4	Asset turnover	5	26	Tobin's q	1	
5	ROI	4	27	Supply chain lead-time variability	1	
6	Market Share	4	28	Supply chain lead-time averages	1	
7	Inventory Turnover	4	29	Purchases	1	
8	Profit Margin	4	30	Net profit vs productivity ratio	1	
9	Revenue Growth	3	31	Liquidity ratios	1	
10	EVA	3	32	Introducing long care issues into financial plan	1	
11	Cash-to-cash cycle	3	33	Growth in market share	1	
12	Working capital	2	34	Fixed asset financing	1	
13	Supplier rejection rate	2	35	Financial planning	1	
14	Supplier cost saving initiatives	2	36	Financial flow integration	1	
15	ROS	2	37	Du Pont analysis	1	
16	ROE	2	38	DCF	1	
17	Rate of return on investment	2	39	Debt management ratios	1	
18	MVA	2	40	Customer query time	1	
19	Information Carrying cost	2	41	Accounts receivable	1	
20	Gross margin	2				
21	Delivery reliability	2				
22	Delivery performance	2				

Table 8.
Frequency of applied measures

No	Measure	Plan	Performance categories		
			Source	Make/assemble	Deliver
1	Cost	✓	✓	✓	✓
2	ROA	✓	✓	×	×
3	Sales	✓	✓	✓	✓
4	Asset turnover	✓	✓	×	×
5	ROI	✓	✓	×	×
6	Market Share	✓	×	✓	×
7	Inventory Turnover	✓	✓	✓	✓
8	Profit Margin	✓	✓	×	×
9	Revenue Growth	✓	×	✓	✓
10	EVA	✓	×	✓	×
11	Cash-to-cash cycle	✓	✓	×	✓

Table 9.
Developed framework

each level using its specific performance measures. In addition, the developed financial performance measures are categorized based on major perspectives of SCOR model as tabulated in [Table 9](#). Therefore, the outputs of this study are unique as they can be applied and investigated using different perspectives.

In summary, this research investigated financial performance measurement of the supply chains. The current available literature on supply chain performance measurement

Table 10.
Cycle view of the
developed framework

No	Supply chain cycle	Financial measures	Strategic	Tactical	Operational
1	Procurement cycle	Cost Inventory turnover Cash-to-cash cycle	✓	✓ ✓ ✓	
2	Manufacturing cycle	Cost Inventory turnover Revenue growth Cash-to-cash cycle	✓	✓ ✓ ✓	
3	Replenishment cycle	Cost ROA Sales Cash-to-cash cycle	✓	✓ ✓ ✓	✓
4	Customer order cycle	Cost Market share Inventory turnover Cash-to-cash cycle			✓ ✓ ✓ ✓

is vast and comprehensive. However, previous literature has ignored to emphasis the significance of financial measures to be used in different cycles of the supply chain. On the other hand, with the progress of nonfinancial performance measures, though, supply chain managers still focus on financial issues in the performance measurement process. In this regard, this research reviewed the financial performance measurement of supply chains. The reviewed studies were categorized based on three major areas of engineering, business and management. Additionally, the papers were classified based on journal frequency, country, applied methods, publication date, research type (application or developmental) and the publishers. According to the obtained results, cost, ROA, sales, asset turnover, ROI, market share, inventory turnover, profit margin, revenue growth, EVA and cash-to-cash cycle are the most common metrics of financial performance measurement. In addition, a framework was developed based on different categories of performance measurement and decision levels of the supply chain. Finally, a flowchart was suggested to implement the framework.

However, although the study specifically reviewed the studies on financial performance measurement of supply chain, the framework of the research, applied methodology, obtained results and suggested directions can be appropriately applied to be further developed. The research finding lies in developing a review study to determine the major concerns and different measures of supply chain financial performance measurement. The research contributions are novel from both research and practical perspectives, since, to the best of authors' knowledge, no similar study has been conducted in previous literature. As an important implication of this research, the obtained outputs clearly highlight the importance of focusing on frequent financial performance measures for supply chain financial performance measurement. In other words, the availability of different financial performance measures has made the process of applying fit measures very hard. In this regard, it is important to review available measures, determine their frequency and develop financial performance measurement framework to measure what is really necessary to be assessed. As a direction for future research, the developed methodology of this study can be applied to assess the performance of supply chains from other perspectives. In other words, other scholars can apply the research procedure for other strategies. In addition, the developed measures can be more investigated with regard to their application in different supply chains.

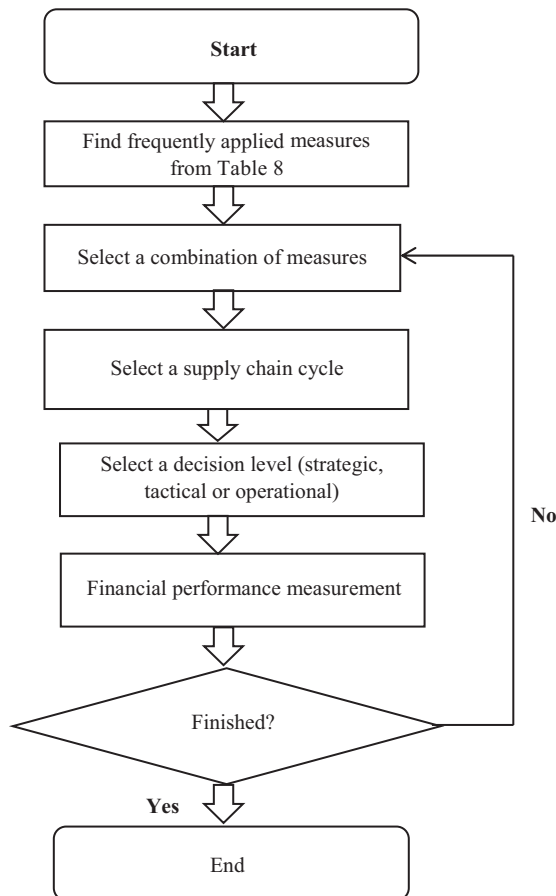


Figure 6.
Model implementation

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