Journal of Supply Chain Management Systems
8 (1) 2019, 25-37
http://publishingindia.com/jscms/

Performance Evaluation Under Business Process Integration: A Critical Review

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Abstract

Managing supply chain in 21st century is rapidly evolving with continuous flow of innovative ideas supported by technology driven solutions. Focused on globalization, business firms, now-a-days, are at par with all business functions that integrate strategic sourcing, operations and distribution to clients at large leading to customer satisfaction. Nevertheless, today's business firms are facing a competitive and complex market environment than even before. Success in business is no longer a matter of analyzing performance of only one specific firm, but that of a chain of firms involved in delivering and supplying; individual firm rather acting as a single entity in the chain of supply. In this study, an attempt has been made to critically review the issues relating to performance evaluation of firms functioning under information communication platform. The extensive literature review is primarily aimed at understanding the complexity and intricacy in evaluating the supply chain performance on an ERP integrated platform. Industry specific case studies, if supplanted with the key findings from literatures, can really make the difference to figure out the underlying factors in synergizing the business process integration to improve supply chain performance, ultimately contributing to firm performance.

Keywords: Business Processes, Enterprise Resource Planning, Supply Chain, Firm Performance, Integration

Introduction

The 21st century business organisations are rapidly evolving as never before with continuous flow of innovative ideas supported by technology driven solutions. More so, globalization of economic activity has set a new trend wherein companies and corporates world over are not only actively contributing to the integration of international business but also aggressively introducing new concepts of business management so as to integrate strategic sourcing, operations and distribution to clients at large leading to customer satisfaction. With the proliferation of Information and Communication Technology (ICT) tools and systems, efficiently managed processes cutting across the departmental boundaries have now fully taken over the age-old practice of function-oriented business activities. Today's organizations are primarily identified with integrated supply chains which are critical to their business operations; so much so that competition is no longer between companies, but between their supply chains. Managing supply chains in a competitive environment therefore becomes crucial for the sustainable existence of a business entity. As the trend goes, firms are becoming increasingly interdependent on each other's supply chains in order to optimize their business performance which is otherwise contributed by firm's own internal operational process having end to end link with suppliers and customers.

For last few decades, academic researchers and industry practitioners are putting their best efforts together to redefine scope and reach of managing supply chain, as business firms are on the constant lookout for effective supply chain models to increase competitiveness and profitability (Gunasekaran *et al.,* 2001). With virtual enterprises growing and global manufacturing and logistics companies spreading their wings all over, coordination of supply chains has become more critical now for business growth in the new tech-savvy domain. Consequent upon this, over the last few years, organizations have shifted their focus of managing supply chain from '*micro-factory level'* to '*broad enterprise-level'* (Gunasekaran *et al.,* 2005). This has led to an upsurge of researches in the field of supply chain management during last three decades or so (Gopal and Thakkar, 2012).

One of the key areas that has been receiving increased attention by the researchers pertains to supply chain performance having direct connection with business performance of an enterprise. Plethora of research works backed with quality literatures substantiate the key findings of authors right from the initiation of the measurement concept associated with business performance (Venkatraman and Ramanujam, 1986) to its subsequent developments like its definition, measures and system (Neely, 1999), models and frameworks (Kaplan and Norton, 1992; Fitzgerald *et al.,* 1991; Heskett *et al.,* 1994; Neely *et al.,* 1996; Kanji, 1998; Bititci *et al.,* 2000; Epstein and Westbrook, 2001; Neely *et al.,* 2002; Ratnatunga *et al.,* 2004). In recent years, however, measurement matrices of supply chain performance have assumed greater significance (Gopal and Thakkar, 2012). Various performance measurement systems on technology aided platforms are driving global enterprises to achieve higher level of business excellence (Papakiriakopoulos and Pramatari, 2010). Notwithstanding the fact that many of the researchers have focussed on devising new methodology to measure performance in organisations, one needs to clearly understand challenges in supply chain environment and find intricacies in its measurement system with specific reference to innumerable business processes (Morgan, 2004).

There is no dearth of research articles to find the linkages to the supply chain performance parameters in the vast domain of business processes with a definite objective to enhance the business performance of an organisation. No conclusive evidences could however be gathered from the voluminous literature study to substantiate this fact either with qualitative case study or results of well documented empirical analysis. Hence, in this study, a deep insight has been made through selected literature reviews to explore and understand the integrated effect of Business Process Management and Enterprise Resource Planning on Supply Chain Performance, which have hitherto not been given due attention by the researchers due to its complexity. Modest effort through this critical review is aimed at unravelling the undefined inter-relationship among the three key parameters which might help to explore new areas for future research study wide across the industries.

Review Methodology

Given evolving trends in supply chain management in recent years, a critical review of existing literatures is essentially required to understand how integrating Information Communication Technology within Supply Chain Management can impact performance in business. Aim of this review is to bring together and present a structured review of references relating to research problem at hand. References with direct bearing on above research problem have been gathered from research articles published in journals of national and international repute. As such, literature survey is extensively reliant on relevant findings of authors' contributions on various journals including Emerald group (Business Process Management Journal, International Journal of Productivity and Performance Management, International Journal of Physical Distribution and Logistics Management, International Journal of Operations & Production Management, Supply Chain Management: An International Journal, Industrial Management & Data Systems)group relating to Elsevier / Science Direct (European Journal of Operational Research, Computers & Industrial Engineering, International Journal of Production Economics) and JSTOR (Strategic Management Journal, Transportation Journal, The Journal of the Operational Research, International Journal of Electronic Commerce).

Most popular methodology of '*key word search'* is employed here to identify articles published in several journals covered under important databases like Science Citation Index, ISI Web of Science, Scopus, etc. Initial key word searches using terms like Business Processes, Business Process Management, Enterprise Resource Planning, Supply Chain Management, Supply Chain Performance, Business Performance, Performance Measurement, etc. sets the pace of this study with a list of more than 500 literatures in total. Out of the lot, around 210 articles only are shortlisted chronologically under different categories to delineate the linkages and interrelationship between the three key parameters as discussed above to arrive at conclusive gaps. Interestingly, output of this review is aligned to construct any hypothesized model that can easily fit to any suitable business sector.

Year wise analysis of data for articles under each of five key words is indicative of the fact that there is diversified interest among research communities over the years to drill through different aspects of items of study. Authors are nevertheless oblivious of the fact that even though there is a lot of interest among research community to implore on all possible angles associated with each of the key word terms, research work on delineating and validating relationship among these items are however very few and far between. It is thus strongly believed that this field is still evolving and therefore wide open for academicians and industry practitioners to explore new frontiers of research, particularly when industry is looking forward to management solutions to get over performance related issues due to stiff market competition in a globalised and integrated / collaborated business environment. Further,

data analysis shows that supply chain management being the key driver to business growth is the prime focus area of study in recent years which of course cannot proliferate on its own strength without necessary backup support from evolving management concepts like six sigma, business process reengineering, business process management, enterprise resource planning, etc. Moreover, in the larger domain of managing supply chain, performance has been getting increased attention during last decade or so as of its versatility and relevance in specific reference to two of its key aspects viz. enhancing performance, and measures and metrics of it (Gopal and Thakkar, 2012).

Hence, to make review process more meaningful and result-oriented from researchers' perspective, it has basically relied upon a new strategy for tracing the logical trails of multiple supply chains in an enterprise which ultimately contributes to performance that in turn gets objectively measured through its constituent parameters. In the first stage of review process, selective literatures on specific areas of supply chain management study have been referred to such as, Collaboration and Trust, (Papakiriakopoulos and Pramatari, 2010), Integration (Fabbe-Costes and Jahre, 2008; Flynn *et al.,* 2010), Product variety (Thonemann and Bradley, 2002); Partnership (Ryu *et al.,* 2009), Organizational structures (Kim, 2007), Collaboration (Simatupang and Sridharan, 2005), Information Technology (Wu et al., 2006), System perspective (Chan and Qi, 2003), Environmental (Shaw *et al.,* 2010), Agile systems (Van Hoek *et al.,* 2001) and Risk (Srinivasan *et al.,* 2011), Measures and Matrices (Otto and Kotzab, 2003). Second stage review banks on important literatures dealing with business processes at length and their gradual evolution to embrace effective and efficient management of supply chains and their performance (Panayides and Lun, 2009). In the third and final stage of review, the possible integration of information and communication technology with the process driven supply chains have been explored to the extent possible to establish synergy level between Business Process Management and Enterprise Resource Planning majorly contributing to Firm's Performance (Gunasekaran *et al.,* 2001).

Literature Support

Stage I: Supply Chain Performance - True indicator of Business Performance

Today's global business is driven by supply chains-a dynamic value chain concept that involves constant flow of information, materials and funds between chain members across multiple functional areas, both within and outside firm's territory (Jain *et al.,* 2009). From a holistic perspective, Supply Chain Management is defined as integration of key business processes within network domain of suppliers, manufacturers, distributors and retailers that improves flow of goods, services and information from original supplier to final customers (Simchi-Levi *et al.,* 2000). It is now widely being perceived as a new age management practice consisting of a set of activities which any business undertakes to effectively manage its supply base (Farley, 1997). Academic scholars have provided a broader view of supply chain management by describing it as a coordinated function of manufacturing, materials, logistics, and distribution and transportation functions within organizations (Lee and Billington, 1992).

Conceptual dimension of SCM has however been evolving fast since its first mention in an article dating back to 1985 as industries are embracing it in a big way to reap in large scale benefits through effective and efficient management of their supply chains with the technology aided tools. With nearly 500 plus articles published till Aug'2014 as revealed from the key word search, it is quite evident that SCM is well ahead of the other management concepts in the business parlance. From the business perspective, SCM is generally viewed as a systematic and strategic coordination of desperate supply chain partners that improves long-term performance (Mentzer *et al.,* 2001; Kauffman, 2002; Kathawala and Abodou, 2003). Of the many business improvement technologies around, SCM is the most sought after one that the organizations adopt to improve business performance (Shepherd and Gunter, 2006). With global competition and outsourcing entering the business arena in a big way, the days of fragmented supply chains are over; the e-SCM or the IT-enabled SCM that supports integration and collaboration is now the way forward (Christopher, 1998). Even though SCM concept has become more broad based now with larger focus on multiple processes, organizations and people, the underlying strength however rests on its capability to propel and improve the business performance of an organization.

Business performance is considered as a multidimensional concept illustrating how well an organization fulfills its financial and market-oriented goals (Qrunfleh and Tarafdar, 2012). While financial goals can be measured by factors such as sales growth, profit margin on sales and return on investment (Cao and Zhang, 2011; Flynn *et al.,* 2010), measurement of non-financial performance is executed through intangibles like product quality, product positioning, customer satisfaction, core competences and

competitive advantage (Cao and Zhang, 2011; Flynn *et al.,* 2010). The latter nevertheless considers long-term perspective of an organization in which there is marked shift in attention from short-term economic goals to long-term corporate goals (Cousins *et al.,* 2008). As comprehensively stated, performance evaluation is a mean to achieve an organization's stated goals (Shukla *et al.,* 2011). Though it is primarily evaluated basing on cost and efficiency parameters (Skinner, 1971), measuring supply chain performance is nonetheless a complex and multifaceted task (Shukla *et al.,* 2011).

Performance measurement in supply chain is meant to help businesses achieve their objectives and fulfill their mission and vision. Most of literature reviews find a coherent relationship between supply chain management and performance; the latter being an outcome to actions made through managing supply chain. But the extent of relationship between the two and relative degree of success in final output as a measure of supply chain performance get influenced with a lot many factors during execution of supply chain activities. A myriad of factors influencing performance have been investigated by researchers whose findings are relevant for the ongoing and future research activities. Empirical analysis on survey data using structural equation modelling lends credence to the positive effects of trust and innovativeness on supply chain performance (Panayides and Lun, 2009). Strategic collaboration among supply chain partners and collaborative management of intra and inter organizational processes positively contribute to performance (Flynn *et al.,* 2010). However, more of supply chain integration does not always improve supply chain performance (Fabbe-Costes and Jahre, 2008). High product variety has got positive impact on supply chain performance, which is achieved by bringing changes in manufacturing process, otherwise linked to supply chain structure (Thonemann and Bradley, 2002). Both strategic and operational parameters affect buyer-supplier partnership that has got a direct bearing on performance (Ryu *et al.,* 2009). Supply chain participants can take help a direct measure of collaboration among chain members, otherwise termed as collaboration index, to measure performance (Simatupang and Sridharan, 2005). Chan and Qi (2003) relies on an innovative performance measurement method that contributes to development of supply chain and employs a fuzzy process based systematic perspective to build a model that measures holistic performance of complex supply chain.

Supply chain performance also gets influenced by surrounding business environment which can be benchmarked for measuring supply chain environmental performance on a relative scale (Shaw *et al.,* 2010). The positive relationship between partnership quality and supply chain performance gets strengthened in presence of high demand and supply-side risks but remains weakened in presence of high environmental uncertainty (Srinivasan *et al.,* 2011). Supply chain models generally treat cost and customer responsiveness as two different performance measures. Researchers have shown that in some instances, a combination of the two would be appropriate for supply chain analysis. However, there are several other measures that have still not been subject of research (Beamon, 1999). Cost and efficiency have always been integral since they are used to measure factors such as return on investment, return on sales, price variances, sales per employee, and productivity and profit per unit production (Skinner, 1971). The cost components that are used aggressively by researchers include inventory costs and operating costs. The facets of customer responsiveness measures that have been focused include lead time, stock-out probability, and fill rate (Beamon, 1999). Many other performance measures that capture several important characteristics of a supply chain are qualitative in nature; hence, could not be incorporated into quantitative models. Such qualitative measures include customer satisfaction (Christopher, 1994), information flow (Nicoll, 1994), supplier performance (Davis, 1993), and risk management (Johnson and Randolph, 1995).

Cost, activity time, customer responsiveness, and flexibility have all been used as supply chain performance measures either singly or jointly. The use of a single performance measure could be subject to criticism given that it could not incorporate other factors needed for evaluation. Several other characteristics can be used to measure performance such as inclusiveness of all aspects, measurability, universality of comparison under various operating conditions, and consistency with the organization goals (Beamon, 1996). Besides analyzing measures based on their effectiveness, benchmarking, both horizontally and vertically, is another important method that should be employed in evaluating performance since it helps organizations in identifying the available improvement opportunities (Camp, 1989). Therefore, if researcher uses a single performance measure, he/she must ensure adequacy of such measure in describing the system performance. Cost, most often used as a single supply chain performance measure by many researchers, ignores relevance of cost categories, cost distortions, incorrect assessment of inventory costs, poor customer response time performance, etc. Hence, cost as a single performance measure, is always subject to criticism,

as any single performance measure used in analysis of supply chain could be non-inclusive (Maskell, 1991; Lee and Billington, 1992; Beamon, 1996). Unfortunately, existing supply chain models have limited their focus on traditional cost measures and have not yet utilized the advantages of strategic cost management. Strategic goals seldom imply one performance measure; rather, they can be judged through many points, both tangible and intangible (Beamon, 1999). Finally, three key elements namely resources, output and flexibility are considered as vital components for success within supply chain management (Beamon, 1999). Hence, strategic performance measurement should include resource measurement, output measurement and flexibility measurement.

Existing business processes and data need to be synchronised together prior to deciding a performance measurement system for a firm operating with supply chain networks (Papakiriakopoulos and Pramatari, 2010). As such, devising a performance measurement system in the context of performance involving multiple supply chains has always been a tricky affair from the management perspective because of several influencing factors within and outside the purview of the organization. Several research works substantiate the key findings on various performance measures viz.resource, output and flexibility (Beamon, 1999); suppliers' delivery performance, customer service, inventory, and logistics cost (Gunasekaran, 2001); customer service, integration, cost effectiveness, and strategic sophistication (Hoek, 1998; Ohdar and Ray, 2004). The other pioneering work includes a fuzzy set theory model designed by Chan, Felix and Qi (2003), Data Envelopment Analysis (DEA) model by Wong and Wong (2007), Integrated Balance Scorecard (BSC) and Analytic Hierarchy Process (AHP) approach for Supply Chain Management (SCM) evaluation Model by Bhagwat and Sharma (2007). For all these innovations, Supply Chain Operation Reference Model (SCOR) is taken as the sole basis for the ongoing research activities in this area. As the supply chains are getting more complex and complicated on the e-commerce digital platforms, a mathematical model proposed by Baçand Erkan (2011) with key performance indicators is found more relevant and contextual to evaluate supply chain performance with reference to flexible characteristics like logistic, market, supplier, machine, labour, information system, and routing of the supply chain.

Improvement on supply chain performance invariably leads to accelerated business performance. This has been substantiated with the findings from both qualitative and quantitative research works by a dedicated group of academicians and industry practitioners. Initially, a group of researchers (Berry, *et al.,* 1999) strongly advocated Business Process Reengineering as key instrument to fetch improvement on supply chain performance. After that, Lockamy and McCormack (2004) employed SCOR Model to identify collaboration as most important factor in Plan, Source and Make areas, and information technology as the key contributor to fourth area of conceptual model i.e. Deliver, which is best described by process integration and information technology. While IT enabled information systems play important role in determining the performance level of its supply chain, information sharing across the supply chain network considerably enhances supply chain performance (Lyons *et al.,* 2004; Fawcett *et al.,* 2007; Stewart, 1995).

No excellence in supply chain performance can however be achieved in the absence of proper organization culture (Cadden *et al.,* 2013). In recent years , quite a few researchers have analysed various other influencing factors contributing significantly to the supply chain performance viz. agility, adaptability, and alignment as part of the supply chain strategy (Whitten *et al.,* 2012), Alignment of the marketing strategies by the partners (Green *et al.,* 2012), Trust and innovativeness (Panayides and Lun, 2009), Product variety (Thonemann and Bradley, 2002), Collaborative planning, Forecasting and replenishment (Chen *et al.,* 2007), Inventory planning (Ganeshan *et al.,* 2001), Co-ordinated inventory management and capacity management (Jammernegg and Reiner, 2007), Market orientation (Lin *et al.,*2010), Strategic purchasing (Paulraj *et al.,* 2006).

Stage II: Business Process Management- Key to Supply Chain Performance

With new business approaches gaining momentum in the global industry circle, organisations are coming out of their functional boundaries and getting identified with their highly integrated business processes (Buxbaum, 1995; Hammer and Champy, 1993; Hammer, 1996; 1999). In changing business scenario, supply chain management is no longer viewed as a functional continuum of suppliers' linkages in the chain of business activities from acquisition of raw material to ultimate delivery of finished products to clients at large. Lambart *et al.,* (1998) were the first to propose that firms need to come out of their functional silos and adopt a process-driven approach. The integration of key business processes right from the stage of original suppliers to the end users providing products, services, and information therefore holds the key to its successful implementation while adding value for customers and other stakeholders (Cooper *et al.,* 1997; Cooper, Lambert,

and Pagh 1998; Ellram and Cooper 1990; Novack et al., 1995; Tyndall *et al.,* 1998).

As opposed to earlier idea that was built on the functional activities, majority of authors in today's context consider Supply Chain Management as a process-driven management tool that integrates key business processes across the supply chain to significantly influence business performance by reducing cost, enhancing quality and speeding operations; so much so that process driven SCM can take business to a new height if the processes are designed and managed efficiently transcending traditional corporate boundaries (Hammer, 2001). The processes that ultimately contribute to business performance include customer relationship management, customer service management, demand management, order fulfilment, manufacturing flow management, procurement, and product development and commercialization (Coombs and Hull, 1996; Lambert *et al.,* 1998).

Three closely interrelated elements namely supply chain network structure, supply chain business processes, and management components drive managing supply chain and business performance. Key to success of firms supply chain in terms of competitiveness and profitability to any organisation lies with effective integration of business processes (Lambert and Cooper, 2000). Interestingly, despite so much of emphasis on process-driven SCM, no 'industry standard' has yet been evolved to link up business processes between separate set of supply chains (Lambert *et al.,* 2004). However, firms may always look forward to enhancing their overall performance by adopting '*process view'* of the organization (Walton, 1986; Porter 1985; Davenport and Short, 1990; Hammer and Champy, 1993; Grover *et al.,* 1995).

Optimization and integration of key business processes, otherwise known as Business Process Management, is considered as a true reflection of efficient management of supply chains in an organization cutting across its functional boundaries (Hammer, 1996; 1999). In recent years, BPM has gained popularity on back of digital disruptions that are forcing businesses across industries to redefine their processes in a way that encourage monitoring, optimization and traceability (Sinur *et al.,* 2013) across entire value chain. Successful implementation of BPM depends a lot on prevalent management culture in an organization. Therefore, management should take an organization-wide holistic approach to BPM implementation (Pantazi and Georgopoulos, 2006).

In true sense, BPM requires an approach with fundamental shift in thinking from '*function-centric to process-centric'* in order to ensure visibility over business processes (Melenovsky, *et al.,* 2005). But, due to different perceptions and conflicting views among peer groups associated with BPM, there is lack of unanimity in approach to the concept among theorists and practitioners. Moreover, lack of process skills in the workforce can adversely impact its implementation (Melenovsky *et al.,* 2005). Hence, clarity on how decision maker interprets BPM and how they intend to use it and support for the business growth of the organization are quite significant during implementation process (Pritchard, and Armistad, 1999; Mires, 2006; Mashari *et al.,* 2003).

Empirical testing of relationship between managing business processes and performance is important for determining the leveraged performance. Recent research refers to complex but positive relationship between business process management, supply chain collaboration, and organizational performance (Pradabwong *et al.,* 2015). Even though supply chain collaboration is considered as an aberration to the process functions in the supply chain management, it has an underlying connotation to business process management as it indirectly influences performance. In simple terms, collaboration within supply chain means both intra and inter organizational relationships at supply chain level.

Not many research papers are available to establish a close link between business process management and managing supply chains. However, there are a few empirical studies that highlight extended relationship of managing business processes with supply chain practices, otherwise known as supply chain collaboration. Such research studies have showcased positive relationship between internal and multiparty resources within supply chain (Nyaga *et al.,* 2010). An organization that is ERP enabled will also be in a better position to collaborate with its supply chain partners (Simatupang and Sridharan, 2008). These findings can be construed as a new shift in focus in the realm of supply chain literature in the recent years.

There is no disagreement among the researchers that create relationships beyond the walls of companies leading to better organizational performance through certain competitive advantages which otherwise could have never been achieved by working individually (Cao and Zhang, 2011). Therefore, focus of supply chain management has now gone beyond the process function to collaborative accomplishment through building of strong partnerships, maintaining relationships and networks for value creation (Lusch *et al.*, 2010). In a recent empirical study, Pradabwong *et al.,* (2015) has shown that BPM improves organizational performance and supports other

related activities, which in turn help to improve internal capabilities. As such, link between BPM and supply chain is seen as the key determinant in achieving business success. However, there is a need to delve more into this relationship to understand how BPM can support collaborative activities of an organization.

Stage III: ERP integrated BPM- Enhancing Supply Chain Performance

Prior to BPM taking over BPR as the conceptual tool to get integrated with ERP, there were different takes by the researchers at large on integration of two management tools for improving business performance. Kræmmergaard and Møller (2000) were the first to observe that ERP systems paved the way for BPR, since implementation of ERP systems requires examination of many business processes (Boudreau and Robey, 1999). But the obvious question that boils down in research parlance is: which of the two should come first - BPR and then ERP, or ERP and then BPR? This was not clearly stated and therefore it was seen that in some cases some organizations were using ERP system to promote BPR (Haq and Martin, 2006), while others were using BPR to implement ERP (Tayler, 1998). However, survey results worldwide are suggestive of the fact that simultaneous implementation of BPR and ERP is the most powerful and effective method of business improvement (Cao and Zhang, 2011).

Before the advent of IT, BPM used to be considered as a holistic management approach to create an organization that operates with high efficiency, quickness, innovativeness, and flexibility which otherwise cannot be achieved through conventional management approaches (Schurter, 2007). Adoption of new and innovative IT tools has however redefined the agility of BPM to a large extent and therefore BPM is now proclaimed as a new management principle that gives companies the competitive advantages which are needed to support more agile and flexible business processes (Moeller *et al.,* 2007). In fact, technology integration to the concepts has made them more acceptable to industry community because of all-round benefits accruing to the organization on their implementation. Organizations too have recognized the significance and consequence of technology in improving efficiency and effectiveness to their business processes (Anand *et al.,* 2013).

With the change of BPM perspective in an integrated IT environment, the definition of its concept too has undergone refinement from time to time; so much so that today it finds mention in many models such as enterprise resource planning, workflow management, case handling, customer relationship management, enterprise application integration, and many more (Weske *et al.,* 2004). Researchers' community are now relying more on BPM as an effective tool and technique that not only manages business processes efficiently but also meets the stakeholders' expectation subsequent to its (Huang *et al.,* 2001). Hence, in today's new business economy, ERP can be demonstrated as an anthology of technologies which are competent to translate the conventional business process models into technology-driven activities that no more require wasting time in routine management functions and control tasks on the part of organizational agents (Antunes and Mourão*,* 2011).

ERP is now widely acclaimed to help business organizations in realizing their benefits through proper planning and investment (Froehlich *et al.,* 1999). Most of the researchers are of the view that integrated ERP systems affect all aspects of business and fetch accrued benefits to the supply chain process of an organization in terms of faster response time, close interaction with supply chain partners, better order management system, more customer interaction, on or before time delivery, minimum inventory holdings, and better cash and receivables management. As such, improvement in supply chain functions and processes eventually reduces direct operating costs and influences the profitability of the organizations.

ERP has evolved as an IT system that integrates all internal functions, working processes and standardized internal data processing procedures besides combining and processing organizational data to provide deeper insights into the efficient functioning of an organization (Laughlin, 1999; Buckhout and Nemec, 1999). Over the years, it has undergone several refinements and improvements that effectively integrated information technology with all information required for operation, be it finance and accounting numbers, data on human resources, production facts and figures, inventory management and/or sales statistics of organization (Laughlin, 1999). At the beginning of this millennium, many researchers were of the view that in times to come, ERP would integrate supply chain management for providing more accurate information to management (Nah *et al.,* 2001; Parr and Shanks, 2000) and today Information Technology has truly enabled emergence of modern supply chain management by being a critical factor to enhance performance (Fawcett *et al.,* 2011).

On a holistic perspective, successful implementation of an ERP system and its conscientious integration with SCM practices provide advantages in the foremost management

functions like planning, decision-making, execution and control, which eventually influence the performance of firms in a positive direction (Ince Huseyin *et al.,* 2013). Most of the firms today have invested largely in developing and implementing information technologies for improving their supply chain performance. While some of them have achieved desired benefits, the rest have got little benefit from the investment (Ye and Wang, 2013). Though the fact remains out of debate that firms are required invest in IT resources for improving their supply chain performance, they however need to take some precautionary measures by investing in the development of some critical success factors and some supply chain characteristics as a priori to derive greater possible advantage from their IT investments (Samadi and Kassou, 2016).

Supply chain management has been gaining wide acceptance because it looks at business organizations as a chain of interconnected entities that can provide transparency across the entire business. Further, these are being modeled in such a way to reduce lead time, inventory and cost at each link under the defined constraints. To study inter-relationship between ERP and SCM, Akkermans *et al.,* (2003) first analyzed test results of 23 separate firms, and then modeled future expectations of ERP systems implementations from an SCM perspective. Result analysis of their empirical study not only justifies the deployment of ERPs in a business organization but also builds case to extend the system scope to integrate suppliers, customers, or both to system, with twin objectives of providing additional e-commerce operations and improving supply chain functionalities.

Supply chain integration aims at integrating internal functions of an organization with operation of external parties engaged in value chain operation, right from original supplier to the end-user, for enhancing competitive advantage in market (Gryna, 2001). There are different ways to integrate supply chains to improve firm performance, but the one suggested by Stevens (1989) that the development of internal supply chain integration should precede external integration with suppliers and customers, redefines strategy for integrating the two. While the internal integration of activities is rather easy from an organizational context, external integration of logistics activities across firm boundaries requires extra efforts and coordination among the stakeholders in the networked arrangement.

Integration of SCM and ERP system has proved to be an effective tool for enhancing the business performance, especially the operating performance that helps the organizations to achieve some competitive advantage over their peers (Li *et al.,* 2006). Moreover, ERP system also leads to improvement in the working condition and provides user-friendly information to the decision-makers (Mzoughi *et al.,* 2008). Hence, ERP systems integrated with SCM modules can effectively streamline the information process, workflow and improve the interaction effect between the employees of the firm to fulfill the common aspirations of all stakeholders, besides achieving the marketing and financial objectives of the organization. Also, companies can achieve competitive advantage by building strategic relationships with limited number of suppliers (Chen and Paulraj, 2004) based on mutual benefits. The relationship between ERP and SCM notwithstanding, an important challenge for businesses is to understand the factors that are critical to successfully reap benefits from ERP systems in order to assess their implications on SCM with the aim to achieve competitive advantage (Adaileh Mohammad and Abu-alganam, 2010).

Concluding Remarks

Organisations always strive for higher supply chain performance to cope up within competitive business environment. Interplay of various factors associated with complex supply chains notwithstanding, the underlying business processes need to be properly managed before being integrated on enterprise resource planning platforms to improve on the existing supply chain performance. Balanced Scorecard and Supply Chain Operations Reference models are most commonly used traditional methods to measure performance of supply chain. Researchers have now diversified viewpoints on the impact of such integration on firm performance and therefore a clearer view is needed that should set a clear tone for future research. Moreover, measures and variables mentioned in this study that seem not to have received due attention may further be tested and verified in near future.

Since there are still dearth of quality research papers either with case study and / or empirical analysis to highlight synergy between managing business processes and enterprise resource planning, authors are nevertheless constrained to make their own logical conclusions. It is however consciously opined that the niche area needs altogether a separate approach i.e. mixed methodology, wherein inputs from industry specific case study findings may act as catalytic moderators to peer reviews in identifying important measurable parameters for managing business processes and enterprise resource planning that can immensely contribute to supply chain performance.

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