
A conceptual framework to measure operational efficiency of apparel industry in emerging economies

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Abstract: Operational efficiency means the organisation's ability to decrease wastage of inputs and maximise resource utilisation. This could be done by increasing supply quality and eliminating the low-quality products and services for customers (González and Álvarez, 2001). Operational efficiency is a useful measure which utilises the available resources (González and Álvarez, 2001). In this study, researcher was able to develop a more concise conceptual framework which can be used to measure the operational efficiency of apparel industry in emerging economies. This conceptual framework is based on an extensive literature review with 50 research articles which discussed on the operational efficiency in Apparel industry of emerging economies. Four different databases have been used to access the research articles in developing this conceptual framework. These are Sage, Google Scholar, Scopus and Pro Quest. This conceptual framework consists of five independent variables which are labour productivity, inventory management, technology, organisations management, supply chain management and dependent variable is operational efficiency.

Keywords: operational efficiency

apparel industry

emerging economies

conceptual framework.

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1 Introduction

The demand for the apparel industry increases with the growth of global population. Even though apparel production increases over time, the rate of increase is not sufficient to fulfil the increasing demand. There is a high demand for apparel industry as it has a great potential to contribute economies of countries which produce apparels. Operational efficiency is driven by operational factors such as human resource management, supply chain management, quality control management, technology etc. Moreover, customer satisfaction and public perception is also important as identified by Slack (2015). To achieve operational efficiency, Jacobs et al. (2014) mentioned that all data of an organisation must collect, record and analyse to define the extent of probability. Operations consist of supply chain management, marketing, finance and human resource management (Staiger, 2017). The operations function needs administration of the production of goods and services. The handling, manufacturing or service processes comprise of operations strategy, product design, process design, quality management, capacity and facility planning (Sayer et al., 2013). Each of these processes needs an ability to examine the present state and discover superior explanations to advance the efficiency and effectiveness of the workshop or service procedures (Gaither and Frazier, 2002).

According to Tuuli and Rowlinson (2010), “operations management is a part of administration distracted with the planning and monitoring protocols which makes and reforms commercial operations in the manufacture of goods or services.” Operations are one of the main tasks comprises with the supply chains, marketing, finance and human resources as identified by Staiger (2017). The identification of the manufacturers’ competitive advantages is highly important in the manufacturing research studies. However, there are relatively limited studies which measured the constructs in published research (Cheng et al., 2017). In operations management research it is evident that few studies focus on individual corporate decisions, inventory management and supply chain management (Cheng et al., 2017).

Feng et al., 2014). A production structure consists of a procedure that transforms inputs (in the procedures of raw materials, labour, and energy) into outputs (in the method of goods and/or services) (Hugos, 2018).

According to the Okwang’a et al. (2015) findings revealed that management factors such as leadership, planning and organising are essential in achieving operational efficiency in the apparel industries. Other factors include communication, financial resource availability, employing other factors that affect operational efficiency and in retaining committed employees (Okwang’a et al., 2015). The research further revealed that most of the apparel industries do not operate efficiently because they are ignorant of the factors that affect operational efficiency and also they do not have financial resources that are necessary in employing these resources (Keiser et al., 2017). Yadlapalli et al. (2018) conceptualised supplier selection and supplier development as the governance mechanisms of social responsibility. This study tested the hypothesised relationship of socially responsible governance mechanisms and firm performance and revealed that both supplier-selection and supplier-development governance mechanisms have a positive effect on a firm’s social and environmental performance in the Bangladesh apparel sector (Yadlapalli et al., 2018).

2 Literature review

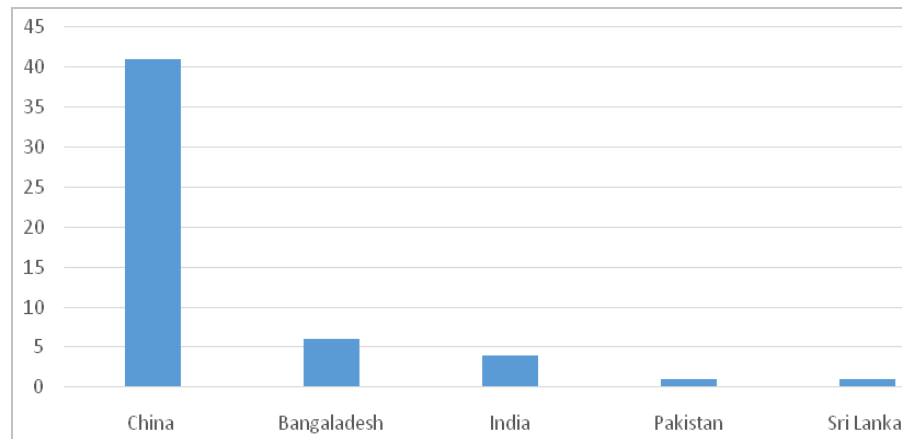
This study engaged with an extensive literature review using 50 research articles. This section covers various scholarly studies on operational efficiency in Apparel sector of emerging economies.

2.1 Apparel industry in emerging economies

Apparel sector in emerging economies are a major export. The demand is increasing as apparels are basic needs of the people and with the growth of the global population. Even though apparel production increases over time the rate of increment is not sufficient to fulfil the increasing demand (Embuldeniya, 2015). World Trade Organization phase-out of the quota system for textiles and apparel in 2005, which provided access for many poor and small export-oriented economies to the markets of industrialised countries (Gereffi and Frederick, 2010). The current economic recession lowered demand for apparel exports led to massive unemployment in the emerging economies (Gereffi and Frederick, 2010).

The China, Bangladesh, India and Vietnam can be considered as some of the major giants in this sector (Gereffi and Frederick, 2010). For most of the emerging economies, apparel sector is the primary stepping stone for industrialisation (Kim et al., 2006). Due to lack of entry barriers and high wage rates, majority of the developed countries import apparel products from emerging economies (Kim et al., 2006). The textile and apparel complex is one of the most labour-intensive industries out of all other manufacturing industries (Kim et al., 2006). Figure 1 illustrates the share of the world apparel exports and apparel's share of total exports based on the World Bank statistics in 2016 to 2017.

Figure 1 Share of the world apparel exports 2016/2017 (see online version for colours)



Source: Based on the World Bank statistics of year 2016/2017

2.2 *Importance of operational efficiency*

The term ‘efficiency’ is common for industrial organisations due to firm-specific factors of management skills, innovation, cost control and market share as determinants of current firm performance and its stability (Kalluru and Bhat, 2009). Operational efficiency is the proficiency of a corporation to limit and maximise resource capabilities which deliver quality products and services to customers (Kalluru and Bhat, 2009).

Improving operational efficiency has a direct impact on the organisations profit margins and efficient firms are more cost-effective. The operational efficiency is vital for any type of business and considered by senior management to earn a healthy and sustainable financial performances (Sufian, 2007). Operational efficiency is often achieved by streamlining the organisation’s core procedures. This contributes to respond efficiently to continually changing market forces in a cost effective way (Barnett and Burgelman, 1996). Therefore it is vital to increase the international market share for any firm to be competitive in the international market. It is highly essential for business organisation’s to improve their operational efficiency when possible. Thus, any business organisation not using effective operational practices experience financial drawbacks (Slack et al., 2013).

According to Jacobs et al. (2014), “operational efficiency is about the output to input proportion, it needs to be calculated on with the input and output values.” Other studies focus on operational efficiency in the prior research which conducted on effective internal control measurements are Dhaliwal et al. (2011) and Feng et al. (2014). It is hypothesises that ineffective internal controls has a negative effect on firm operational efficiency. The ineffective internal control can result in inaccurate internal management reports (Feng et al., 2014). To achieve operational efficiency (Jacobs et al., 2014), an organisation must collect, record and analysis data to define the extent of probability. Operational efficiency is the key determinant for long-term solvency for any business, in fact, firm-specific determinants of financial performance involve operating efficiency and financial risk. Some of the major studies are summarised in Table 1.

2.3 *Operational efficiency using data envelopment analysis model*

A study conducted by Arunkumar and Ramanan (2017) mentioned that operational efficiency of the food and beverages industry in India is determined by identifying the technical and scale efficiencies by applying data envelopment analysis (DEA) models. The first stage DEA analysis revealed that the inefficiencies such as scale and technical inefficiencies exist in the Indian food and beverages industry and a majority of inefficient firms are operating in the increasing returns to scale region. Another finding of this study was that determinants of these inefficiencies are due to current ratio and financial assets to total assets ratios which are contributing significantly to the inefficiencies (Arunkumar and Ramanan, 2017). Similarly the operational efficiency is assessed in the hospitals using the DEA models and the results illustrated by comparing the solutions of complete datasets against the simulated versions of the same datasets with missing data. The sensitivity of each method on the efficiency scores and ranking of the decision-making units are presented (Aksezer and Benneyan, 2010).

Table 1 Summarises the studies of operational efficiency in apparel sector

	Year	Author	Findings
1	2002	Moore	Study is based on retailer profitability in the USA apparel retailing sector. This study examined the impact of different strategies on organisations performance. Specifically, operational efficiency, marketing effectiveness and innovation are examined by identifying its influence on operational and financial performance. Findings suggest that operational efficiency and marketing effectiveness as well as innovation has a positive influence on performance of the domestic retail industry. This study consist of the implications which are suitable for theory and practice (Moore, 2002)
2	2001	Deraniyagala	Study examined the effects of technology accumulation on firm-level technical efficiency in the Sri Lankan clothing and agricultural machinery industries, using cross-section survey data. The analysis shows simple adaptive technical change to have a significant and positive effect on efficiency in both industries. In addition, variables relating to technological skills and training also emerge as significant determinants of firm-level efficiency (Deraniyagala, 2001)
3	2010	Joshi and Singh	Study is about the Indian apparel sector. Main findings indicated that the small-scale firms are found to be more productive than the medium and large-scale firms. The decomposition of apparel industry growth into technical efficiency change (catch-up effect) and technological change (frontier shift) reveals that the productivity growth is contributed largely by technical efficiency change rather than by technological change (Joshi and Singh, 2010)
4	2006	Scott	Study is based on geographic investigation of low-technology, labour-intensive industries which are on invoking notions of industrial organisation, locational agglomeration, and spatial divisions of labour. The distribution of the clothing, footwear, and furniture industries across the contemporary world is described on the basis of detailed published statistics. This also examined international flows of finished products and production-sharing activities involving various kinds of subcontracting arrangements between high-wage and low-wage countries. The significance of low-wage, low-technology industries for processes of economic development is also investigated by this study (Scott, 2006)
5	2002	Moodley	Study discussed the role of e-business with special reference to connecting to markets, productivity gains, potential cost savings, and systemic efficiencies. The empirical evidence suggested that e-business in the garments industry is in its infancy. The South African apparel industry is at a critical stage in its development after a declining period. This also argued that the clothing sector's importance on job creation, and foreign exchange earnings for South Africa which depends on how well policymakers and industrialists understand the forces shaping the market and are prepared to move fast to create the necessary conditions for a coordinated fast track lift-off (Moodley, 2002)
6	1998	Ramaswamy and Gereffi	The discussion of this study is on the apparel sector of India and focused on three themes: first, the interlinkages in the organisation of international economic activity and the changing competitive conditions in the global apparel market; second, the associated importance of distribution and marketing links in the apparel production chain; and third, the cotton fabric-based nature of India's apparel exports and its competitive advantage (Ramaswamy and Gereffi, 1998)

Source: Constructed by the author

Table 1 Summarises the studies of operational efficiency in apparel sector (continued)

Year	Author	Findings
7 1999	Bhattacharya and Rahman	Study focused about the women entering the industrial labour force in Bangladesh generally finds themselves in low skill/low wage jobs with special reference to apparel sector. Nevertheless, increasing liberalisation of the global textiles market creates new challenges for countries and industries that rely on a low skill/low wage strategy. They eventually find it difficult to increase productivity, and thus to retain their place in increasingly competitive markets. A second incentive for change is provided by the phasing out of the multi-fibre arrangement, which limited inputs of domestic origin in clothing production. In the current situation, Bangladesh has a unique opportunity to restructure its domestic apparel sector, introducing new technologies and fostering domestic production linkages. Findings indicated the public sector allocations combined with private sector training of the female labour force, which can stimulate women's engagement in the apparel sector, raise their productivity and ultimately improve their livelihoods (Bhattacharya and Rahman, 1999).
8 2004	Fernie and Azuma	This paper explored the future direction of fashion in the industrialised economies through the experience of the Japanese fashion industry from a small manufacturers' perspective. Empirical findings from a questionnaire survey revealed the fundamental gaps that exist between the theory and the practice. Several survival strategies been introduced in this study for domestic apparel manufacturing in the industrial economies (Fernie and Azuma, 2004)
9 2009	Miller and Williams	This article examined the ways in which a living wage might be implemented in the global apparel sector. This also argued that an increase in the unit labour cost element of the free on board price paid by brands by a factor equivalent to the difference between the existing wage and a nationally determined living wage figure would not impact in any serious way upon retailer or brand-owner's (or supplier's) bottom line. The existence of fragmented and outsourced manufacturing, accompanied by aggressive buying practices, militates against 'aspirational' code provisions in this area. Limited progress is possible only through substantial brand collaboration, an acceptance of collective bargaining through trade unions in supplier factories and, longer term, moves by brands and retailers to own and control their own manufacturing capacity (Miller and Williams, 2009).
10 2003	Moodley, Sagren	The paper suggests a raft of policy measures designed to create an enabling and nurturing environment aimed at promoting and accelerating the diffusion of B2B e-commerce technologies in the SA apparel sector (Moodley, 2003).
11 2003	Roberts and Thoburn	This paper examines the responses of firms in the textile industry of South Africa to that country's rapid liberalisation of trade since the early 1990s. Findings indicated that increased exports accompanied by reductions in employment and contraction of production of yarns and fabrics. It also documented how competitive pressures from imports have led firms to increase their exports. Firms focusing on non-price factors of export competitiveness have been better performing. Firms have also been most successful where technological capabilities based on the domestic market provided a foundation for export competitiveness (Roberts and Thoburn, 2003).
12 2004	Moodley and Morris	Study focused on adoption of e-commerce applications is promoted in the developing world as a systemic innovation offering producer firms new exchange mechanisms that enable them to compete on a more equal basis in world markets. Empirical evidence obtained from researching leading garment exporting firms in South Africa suggests that B2B e-commerce is not as effective in reducing transaction costs or in opening up new global market opportunities as claimed by the 'optimists'. It has only marginally altered trading and business patterns between international buyers and sellers in the garment industry. The findings indicate that trading relationships in this sector are fostered over extended periods of time, depend on non-contract-based activities and on complex information requirements and tend to be highly personalised (Moodley and Morris*, 2004).

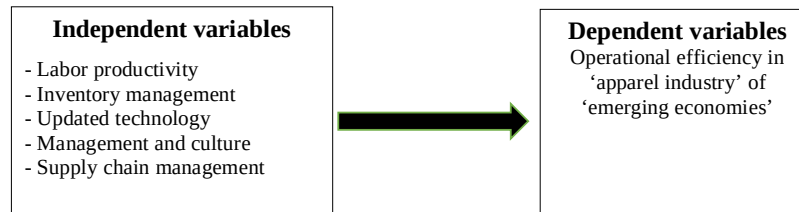
Source: Constructed by the author

3 Methodology

The *major objective* of this paper is to develop a more concise conceptual framework which can be used to measure the operational efficiency of Apparel industry in emerging economies. This conceptual framework is developed using an extensive literature review by referring to 50 research articles conducted on operational efficiency in apparel industry in emerging economies. The *primary data* collection is through four different databases which have been used to access the research articles. These databases are Sage, Google Scholar, Scopus and Pro Quest. These databases were used in developing this conceptual framework. Additionally, researcher used other published books. The variables presented in the conceptual framework are based on the literature review. Therefore, the five variables analysed the specific phenomenon of the study. Consequently, conceptual framework comprised of only five independent variables which are labour productivity, inventory management, technology, management and culture, supply chain management. The description is a justification of the following variables. Therefore, the most applicable research design for this paper is positivism or quantitative methodology.

The proposed conceptual framework which is based on the evaluation of the literature review is illustrated in Figure 2.

Figure 2 Proposed conceptual framework (see online version for colours)



Source: Constructed by the author

The conceptual framework consists of five independent variables which are labour productivity, inventory management, technology, management and culture, supply chain management and the dependent variable is operational efficiency. These five variables are justified using the literature review below.

3.1 Labour productivity

For the service sector it is essential to have an exact method to measure the input and output ratios rendered by the workers. Productivity is well-defined as the ratio between the output volume and the input volume (Hulten, 2001). Workforce productivity is the amount of goods and services that a worker produces in a given amount of time. Out of all the factors of production labour hours are of highest priority and the most important factor of production and plays an essential role in parts of efficiency and superiority. He also stated that, "The concept of productivity is often measured differently. However, in a more subjective manner, by asking about the degree to which the work environment influences productivity" (Hulten, 2001).

The Organization for Economic Co-operation and Development (OECD) defines the work force productivity as "the ratio of a volume measure of output to a volume measure

of input”. The concept of productivity is often measured differently, with the degree to which the work environment influences productivity in a more objective manner by using the number of hours or percentage of idle time (Bergs, 2002). A number of indicators provides as an indication to represent these factors. Similarly, Bergs (2002) uses

the quantity of work, quality of work, meeting deadlines, frequency of errors, responsibilities, creativity, interpersonal relations, as the main factors.

The main objective of human resources management is to utilise the human resources in a most optimal manner so that targets can be achieved very effectively and efficiently. For this purpose, managing performance of employees is vital. Therefore the performance management maintains, develop and motivates the people at work to give better results. In the present competitive situation, the organisation that gives better results can survive, stabilise, grow and excel in the performance. It helps a lot in achieving the objectives of ‘human resource management’. Performance management includes activities to ensure that goals are consistent effective and efficient. Performance management can focus on performance of the organisation, a department, processes to build a product or service, employees, etc. (Kotler and Armstrong, 2010).

H1 Labour productivity is positively related to operational efficiency.

H2 Labour productivity is negatively related to operational efficiency.

3.2 *Inventory management*

According to Jarkas and Bitar (2011), “the objective of inventory management is to strike a balance between inventory investment and customer service.” Therefore it is impossible to achieve a low-cost strategy without a proper inventory management system (Jarkas and Bitar, 2011). Therefore (Stevenson and Hojati, 2007) states that to accommodate the functions of the inventory, there are four main types of inventory as follows such as ‘raw material inventory’ which is the materials that are usually purchased hence in the working progress stage in the manufacturing process. This inventory can be used to decouple supplier from the production process.

However, the preferred approach is to eliminate supplier variability in quality, quantity, or delivery time so that separation is not necessary. Second, ‘working in process (WIP) inventory’ that are components or raw material should undertake some changes. WIP exists because of the time it takes for a product to be made (cycle time). Reducing cycle time reduces inventory. Third, ‘maintenance/repair/operating supply inventory’ that are inventories devoted to maintenance/repair/operating inventory supplies are necessary to keep machinery and processes more productive. This type of inventory exists as the need and timing for maintenance and repairing for some equipment is unknown. Although the demand for MRO inventory is often a function of maintenance schedules, other unscheduled MRO demands must be anticipated. Finally, finished goods inventory is a completed product awaiting the shipment. Finished goods are inventories as future customer demands are unknown, but still an asset on the company financial statements.

H3 Inventory management is positively related to operational efficiency.

H4 Inventory management is negatively related to operational efficiency.

3.3 Updated technology

A company can produce goods or services that are widely available or internationally competitive using the technological progress made in a specialised field (Porter, 2000). Again, real and perceived benefits must be differentiated. Many companies believe they are the only products or services, even though this might not be the case in the international market. If products or technology are unique, however, company can positively offer a competitive edge and effect in major business achievements abroad. One problem to think is how long such a technological or product benefit will carry on. In history, a company with a competitive edge could calculate on being the only supplier to foreign markets for years to come. This kind of benefit, however, has shrunk dramatically because of competing technologies and a common lack of international patent protection (Porter, 2000). Many manufacturing business organisations are using information and communication technology (ICT) in there all supply chain management activities (Naude and Badenhorst-Weiss, 2011a). ICT is the latest technological concept defined as an extensive method (Yew Wong et al., 2005).

H5 Updated technology is positively related to operational efficiency.

H6 Updated technology is negatively related to operational efficiency.

3.4 Management and culture

Based on the type of business and the environment within it, different companies would have different forms of culture within their workplace. The culture would have direct connection with the processes and the stakeholders that the company is associated with (Maximini, 2015). When considering the management of an organisation, the proper guidance and senior management consultancy is a vital element in operational efficiency (Flynn et al., 2016). As one of the major responsibilities of top management is to provide sufficient financial support and adequate resources for building a successful supply chain management system, the support of management will ensure that the organisation has a high priority with required resources and attention. The lack of financial support and adequate resources will inevitably lead to failure. In addition to that primary support, there should be a directing committee, which can sponsor the money, ensure visibility and motivate the team (Simatupang et al., 2004).

The organisational culture relates to the situation and work environment that the managers and employees are associated with. The basic framework for organisational culture is the set of rules and regulations that are in place, and within this framework, the values, practices, and contribution of the staff shape up the culture (Homburg and Pflesser, 2000). There are various elements such as business type, processes, demographics and attitudes of the staff contribute immensely to the culture. The 'corporate culture' is defined as mutual potentials, performs and objectives that are common through the mainstream of the group (Naude and Badenhorst-Weiss, 2011b). The aspect of 'proper management' is a serious factor for effective operational efficiency and productivity performance of the business (Chopra and Meindl, 2007). Leadership management needs communal culture, privacy guard, responsibility, high management knowledge, good attitude and specialised, decisive in decision making and principles with constant performance measurement Naude and Badenhorst-Weiss, 2011b). Similarly, the same authors stated that businesses have unsuitable or inadequate cultural

basics are persuaded to be unsuccessful when approving operations management practices. As per Sohrabpour et al. (2016) an effective supply chain is determined by organisational commitment and power.

H7 Management and culture is positively related to operational efficiency.

H8 Management and culture is negatively related to operational efficiency.

There are four categories of which are compulsory to accomplish high supply chain performance such as higher management support to departmental support, channel support and infrastructural support (Sohrabpour et al., 2016).

3.5 Supply chain management

Cucchiella and Koh (2012) defined supply chain as an integration of complex tasks in getting and achieving customer satisfaction. Similarly, Cucchiella and Koh (2012) mentioned a supply chain as a network that supplies a specific product than raw material to finishing product. Ayers (2006) mentioned that the common objective of any supply chain activity as the achievement of efficiency. The conception of effectiveness as per (Naude and Badenhorst-Weiss, 2011b) is an actor's capability to supply resolutions that offer price to marketplaces (customers). The supply chain practices are referring to complete group of activities which are completed in business organisations to improve the efficiency in the internal supply chain activities (Yew Wong et al., 2005). The present evaluation of the supply chain activities and practices that contains partnership with the supplier, procedure of outsourcing, compression of cycle time, continuous process flow and sharing or technology and information, purchasing the supply quality and relations, customer supply chain practices are defined as a set of activities conducted for an organisation to promote effective management of its supply chain (Msimangira, 2003). A study by Joo et al. (2009) rated the suppliers influence as comparatively common measurable characteristic. An anonymous mid-size manufacturing company in the aerospace industry has provided a full year of historical data on its 30 largest tier 1 suppliers to aid this work. This study applies DEA to the supplier data and results in the comparative rankings of supplier performance.

According to Reimann and Ketchen (2017) supply chain practices refers to how business organisations utilise their organisational supplier processes, technology and capabilities to improve supply chain performance and organisational competitive advantage and how the manufacturing, logistic, materials, distribution and transportation functions are coordinated in organisations. This also includes supply chain practices and means which involved in business organisations planning and strategy for coordination of supply chain practices. The collaboration between business functions internally as well as across company is also a part of supply chain management practices (Reimann and Ketchen, 2017). Furthermore, based on the above extensive literature review a more concise framework is used to measure the operational efficiency of apparel industry in emerging economies.

H9 Supply chain management is positively related to operational efficiency.

H10 Supply chain management is negatively related to operational efficiency.

4 Future research perspectives

The present research focused on apparel sector. The same study can be conducted to other industries such as tea and rubber manufacturing sector. This study can expand by using the perspectives and viewpoints of employees, stakeholders including suppliers, buyers and customers in order to get a complete picture of the scenario. According to the literature review, one gap which is evident was that for future researchers less research on operational efficiency in apparel industry. Majority of those studies focused on the developed countries with less study focusing the emerging countries. Majority of the existing studies used quantitative data collection methods such as surveys, questionnaires and few studies used qualitative or exploratory approaches with semi-structured interviews and open ended surveys as the main data collection instruments. Furthermore, this is a cross-sectional case study and that a longitudinal study may enhance the understanding of trends over time with regard to operational efficiency in apparel industry which is another area for the future research.

5 Conclusions

As mentioned above, operational efficiency in emerging economies is an interesting research area. The main objective of this study is to develop a more concise conceptual framework which can be used to measure the operational efficiency of Apparel industry in emerging economies. This conceptual framework is based on an extensive literature review with 50 research articles which assessed or discussed about the operational efficiency in Apparel sector of emerging economies. Four different databases been used to access the research articles, such as Sage, Google Scholar, Scopus and Pro Quest in developing this conceptual framework. This conceptual framework consists of five independent variables which are labour productivity, inventory management, technology, organisations management, supply chain management and operational efficiency as the dependent variable. As a unique contribution this paper investigated five major factors which affect the operational efficiency in apparel sector of emerging economies. This will facilitate the future researchers as they can use this conceptual framework to measure the operational efficiency in apparel companies. This model has not previously used to evaluate the apparel sector thereby providing the future researchers to measure operational efficiency. The other theoretical implications are that more theoretical frameworks are necessary to evaluate operational efficiency. Based on the literature review it is evident that less research conducted on measuring the operational efficiency in apparel sector of emerging economies.

6 Limitations

There are certain limitations in this study. The study is limited towards the four databases which are Sage, Google Scholar, Scopus and Pro Quest in developing this conceptual framework. These variables were not tested due to the limited time constraints. It is argued to have limitations due to the lack of well-defined structure and protocols as this study is applicable for a cross sectional case study and not a longitudinal study (Yin,

1999). Therefore, the researcher mitigated this limitation by using the conceptual framework of developed using the literature review which provides a proper structure.

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