
Advancing Operational Performance of Manufacturing Sector through Lean Adoption: A Conceptual Model

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Abstract: *In recent decades, the concept of performance has earned a lot of attention, and it is now universal in practically every aspect of human endeavour. This paper will focus on quality and cost as measures of the concept of performance by establishing a sturdy conceptual base for operational performance upon which future empirical studies can be based. Finally, this paper add nuance to lean adoption by using continuous improvement, customer involvement and customer focus as its facets which amplifies the link with performance of the manufacturing sector. The conceptual framework of this paper supports analytical thinking by outlining the fundamental processes necessary for an organisation to operate optimally and establishing future research directions.*

Key Word: *Cost, Continuous Improvement, Lean Adoption, Customer Focus, Customer Involvement, Operational Performance, Quality*

INTRODUCTION INTRODUCTION

Operational Performance is the strategic dimensions in which organisations choose to compete (Chavez, Yu, Gimenez, Fynes and Wiengarten (2015), and also the foundation of quality practices and the general performance of organisations (Sharma & Modgil, 2020). A better operational performance can improve effectiveness of production activities, create high-quality products, services and processes (Kaynak, 2008; Chavez, Gimenez, Fynes, Wiengarten & Yu, 2013), satisfy more customers or clients (Ou, Liu, Hung & Yen, 2010; Lau, Lee & Jung, 2018) and, increase revenue and profit (Zhang & Xia, 2013; Santos, Lannelongue, Gonzalez-Benito, 2019). I define operational performance as an assemblage of principles and standards that are used by organisations to control cost, enhance quality, time, flexibility, competitive advantage, and customer satisfaction.

Abdulmalek and Rajgopal (2007) defined lean adoption as the process of identifying all forms of waste in a supply chain's value stream and the use of the appropriate tools to eliminate waste and minimise lead time. Comparatively, Shah and Ward (2007) perceive lean adoption as a multidimensional approach encompassing a wide range of managerial practices including quality systems, continuous improvement, customer involvement, cellular manufacturing, work teams, supplier management and just-in-time (JIT) within an integrated system. We define lean adoption as a means to implement and achieve a predetermined outcome that can greatly enhance performance.

Past studies from scholars (Karlsson & Åhlström, 1996; Shah & Ward, 2007; Malmbrandt & Ahlstrom, 2013, Aderaw, 2019; Afunwa, Agbaeze, Ike & Isichei, 2020) dimensionalized lean adoption into customer value, continuous improvement, customer involvement, customer focus, continuous flow, and pull system. This study shall focus on continuous improvement, customer involvement and customer focus (Shah & Ward, 2007; Aderaw, 2019).

These three facets of lean adoption helps to It eliminates unnecessary processes, increases productivity, enhances quality and shortens lead times thereby reducing the overall cost (Karlsson & Åhlström 1996; Ghosh, 2013). Furthermore, it has emerged as one of the most significant constructs at the behest of organisations to meet dual objectives of improving quality, flexibility and delivery while at the same time focusing on cost reduction (Jasti & Kodali, 2014).

The importance of manufacturing cannot be overblown because Manufacturing firms are major contributors to economic developments of both developed (KPMG, 2016; Trading Economics, 2018) and developing economies (Modgil & Sharma, 2015; Moureen & Borniface, 2019). Through manufacturing firms, revenues to governments (Gross Domestic Products (GDP) and taxes), innovativeness and job creation have been provided (Akoto, Awunyo-Vitor & Angmor, 2013; Iheanacho, 2016; Bawa, Asamoah & Kissi, 2018; Moureen & Borniface, 2019). These roles attributed to manufacturing firms cannot be sustained without a robust operational performance (Olanrewaju, 2021). Developing economies such as Brazil, India, Mexico, Thailand and Taiwan, have seen their manufacturing sectors contribute, about 15% to 35% to GDP and 30% to 45% to employment opportunities (KPMG, 2016; Trading Economics, 2018). They also play key roles in transforming idle resources into beneficial products. Their central mandate is to satisfy the needs of customers through an enhanced operational performance (Ojha, Vij & Vrat, 2014; Okwang'a, Mungania & Karanja, 2015).

Albeit the Nigerian manufacturing sector cannot support economic development in its present condition, it has great potential since Nigeria is one of the most attention-grabbing markets of the region and with a population of over 206 million consumers as at 2020 (Olanrewaju, 2021). The importance of the manufacturing sector is also realized from the fact that private consumption expenditures are significantly increasing in the country up to the rate of 25% to 40% as at May, 2021 (National Bureau of Statistics, 2021).

2. LITERATURE REVIEW

2.1 The Nigerian Manufacturing Sector

The manufacturing sector is a vehicle for producing goods and services, as well as expediting good jobs and earning significant benefits for players of the economy (Sola, Obamuyi, Adekunjo & Ogunleye, 2013). Manufacturing has long been regarded as a catalyst for global economic growth, development and industrialization (Afolabi & Laseinde, 2019). Manufacturing is Nigeria's third largest sector in terms of employment, after agriculture and trade (Nigerian Economic Summit Group, NESG, 2021).

The manufacturing sector in Nigeria is made up of 13 subsectors. They include: Basic metal, Cement, Chemical and Pharmaceutical Products, Electrical and Electronics, Food, Beverage and

Tobacco, Iron and Steel, Pulp, Paper and Paper Products, Non-Metallic Products; Plastic and Rubber products; Motor vehicles and assembly, Oil Refining, Textile, Apparel and Footwear, Wood and Wood Products and Other Manufacturing (NESG, 2021). As at 2020, three of the thirteen sub-sectors accounted for 87% of total manufacturing output. These three sectors are Food, Beverage and Tobacco (37%), Textile, Apparel and Footwear (32%) and Cement (18%). This implies that the remaining ten sub-sectors contributed a combined share of 13% to manufacturing output in the year.

In terms of exports, manufactured items accounted for 7.7% of total export revenues in Nigeria in 2020. According to data from the National Bureau of Statistics (NBS) (2020), manufactured goods exports averaged 6.2 percent of manufacturing sector GDP over the last four years (2017–2020). Oil exports earnings in 2020 was 11.5 times larger than export earnings from the manufacturing sector (11.089.3 Billion Naira for oil, as against 960.8 Billion Naira for manufacturing).

2.2 The Concept of Performance

The term "performance" initially appeared in the mid-nineteenth century to describe the outcomes of a sporting competition. The concept of performance is crucial to a company's survival. It is a fundamental outcome variable of interest in business and management research, ranging from human resources and marketing to operations management, international business, strategy, and information systems (March & Sutton, 1997; Hult *et al.*, 2008; Richard, Devinney, Yip & Johnson, 2009). Kaplan and Norton (1992) defined performance as a set of both financial and non-financial indicators capable of assessing the degree to which organizational goals and objectives have been accomplished.

Importantly, performance can also be measured based on subjective information gathered from managers or other key informants, asking them to rate their company's overall performance such as their market share, profitability, innovation efforts, performance of human resource practices, and such other attributes. It has been argued that objective measures are more robust than subjective measures as managers may be reluctant to draw attention to shortcomings and instead may seek to overstate the performance of their organizations (Dess & Robinson, 1984; Powell, 1992; Fey, Bjorkman & Pavlovskaya, 2000; Bjorkman & Budhwar, 2007; Razouk, 2011).

2.3 Operational Performance

Operational performance is conceptually defined and explained as competitive priorities (quality, flexibility, cost and dependability) of operations strategy (Wang, Huo, Fujun & Chu, 2010). According to Chavez *et al.* (2015), operational performance is the strategic dimensions in which organisations choose to compete. Furthermore, it is the foundation of quality practices and the general performance of organisations (Sharma & Modgil, 2020). Assemblage of principles and standards that are used by organisations to control cost, enhance quality, time, flexibility, competitive advantage, and customer satisfaction. We define operational performance as an assemblage of principles and standards that are used by organisations to control cost enhance quality, time, flexibility, competitive advantage, and customer satisfaction.

Furthermore, operational performance is a vital determinant of competitive advantage (Schroeder, Shah & Xiaosong-Peng, 2011) that leads to improved revenue and returns for organisations (Zhang & Xia, 2013). In the manufacturing sector, operational performance is a means to enhance production to the barest minimal cost in order to maximize profit. It is also, an avenue to attain the peak of production by doing things differently, promptly, and at lower cost (Russell & Koch, 2009). Operational performance unites the whole activities of a firm such as after-sales service, manufacturing, and procurement as an end-to-end system (The Economist, 2008; Jaeger, Matyas & Sihn, 2014).

2.4 Measures of Operational Performance

This study considered operational performance as a group of standards and benchmarks that are adopted and used by organisations to achieve competitive advantage, customer satisfaction, and maximum level of profitability. Following prior studies from a large spectrum of scholars (Rosenzweig & Easton, 2010; Saleh, 2015; Sylva, 2020), OP entails a number of distinct measures such as flexibility, time (speed), quality, cost, innovation, and environment and safety. According to Marodin (2019) and Sylva (2020), cost, quality, defects minimization, delivery, innovation, least possible work in progress, and capacity utilization are the core and most often mentioned dimensions of OP in manufacturing organisations.

However, this study adopted quality and cost to measure operational performance (Saleh, 2015; Sylva, 2020). They are discussed below:

2.4.1 Quality

Quality is a multi-faceted and intangible construct (Zhang, 2001; Charantimath, 2011), since different definitions of quality are appropriate under different circumstances (Sebastianelli & Tamimi, 2002; Ojasalo, 2006). Quality is the extent to which the core products offered by a firm meet customers' needs and wants (Noble, 1997; Ward, McCreery, Ritzman & Sharma, 1998). Furthermore, Sylva (2020) averred that quality "is a measure of the extent of durability, reliability, functionality, superiority and overall excellence of a product or service which leads to favourable user experience" (p. 302). We define quality as the degree to which a process, product, or service leads to a specified set of requirements.

In the context of manufacturing, (the 'search for excellence' is not new) quality is inbred in a Darwinian philosophy for the survival of the fittest. Thus, quality is an expression of this excellence which gives a firm's product an edge over another and guarantees its survival by establishing a new standard of quality (Tapiero, 1994). Quality as a major facet of operational performance entails doing the right things according to specification and customers' satisfaction. It is associated with consistency as regard product or service. Quality reduces costs, increase reliability as well as customer loyalty (Montgomery, 2014). According to Sylva (2020), higher quality results in higher loyalty, market share, revenues and user satisfaction.

2.4.2 Cost

A common and important measure in evaluating operational performance is cost (Noble, 1997). Cost is the monetary expense associated with running an organisation (Ward *et al.*, 1998). Cost is the total amount incurred to carry out a specific operation (Bowersox, Closs & Cooper, 2009). Vaidya and Hudnurkar (2012) defined cost as the summation of all administrative and service costs, inbound and outbound freight, third party storage cost, order processing cost, direct labour cost, and warehouse cost. It is “a measure of the naira value (Nigerian currency) of the resources used to produce goods or deliver services; the required payment to manufacture a product or create utility” (Sylva, 2020, p. 302). We define cost as the total amount and expenditures that are incurred by accomplishing every specific activity or operation.

In order to maximize profit, cost must be minimized. As a result, organisations implement cost reduction strategies that underscore reduced inventories, removal of non-value added activities, and maximisation of resource utilization (Sylva, 2020). Cost helps organisations to reduce the wasteful use of resources, defective output and inventory to minimum level (Saleh, 2015). In order to enhance operational performance, reducing the overall costs entails the following: reducing inventories, maximum utilisation of resources, work- in- process inventory turnover, and eliminating non-added value activities.

2.5 The Concept of Lean Adoption

Lean adoption was developed by the Japanese automobile manufacturer Toyota and embraced by many other major companies across the world in an attempt to remain competitive in an increasingly globalized market (Shah & Ward, 2007; Hosseini, Nikakhtar, Wong & Zavichi, 2012). To pursue lean adoption and optimize performance, organisations have to manage variability in supply, flexibility, processing time, cost, quality, and demand (Hopp & Spearman, 2004; De Treville & Antonakis, 2005), which in turn require organisations to effectively manage their social and technical systems simultaneously. Abdulmalek and Rajgopal (2007) defined lean adoption as the process of identifying all forms of waste in a supply chain’s value stream and the use of the appropriate tools to eliminate waste and minimise lead time. Lander and Liker (2007) describe lean adoption as a means to implement and achieve a predetermined outcome that can greatly enhance cost, delivery and quality. Lean adoption has emerged as one of the most significant constructs at the behest of organisations to meet dual objectives of improving quality, flexibility and delivery while at the same time focusing on cost reduction (Hasle, Bojesen, Langaa-Jensen & Bramming, 2012; Jasti & Kodali, 2014). Effects of lean adoption on performance have been submitted by various scholars (Belekoukias, Garza-Reyes & Kumar, 2014). Organisations selectively cling to lean practices that aid their decision making. Collectively, the selected block of lean practices affects operational performance in terms of quality, cost, quality, flexibility and speed (Vilkasa, Koreckaja, Katiliute, & Bagdonienø, 2015).

2.6 Dimensions of Lean Adoption

There are several typologies of lean adoption that have been explored in literature. Earlier studies used focused on factory production, continuous improvement, quick changeover, lot size reduction, customer involvement, cross-functional work teams, preventative maintenance, safety

improvement programs, total quality management (Shah & Ward, 2003). However, recent literature is replete with other sets of lean adoption dimensions such as customer value, continuous improvement, customer involvement, customer focus, flow design, and pull system (Karlsson & Åhlström, 1996; Shah & Ward, 2007; Malmbrandt & Ahlstrom, 2013). Furthermore, to comprehend with the effect of lean adoption and its interactive effect on operational performance, three dominant lean adoption dimensions (continuous improvement, customer involvement and customer focus) that are apparent in today's lean literature (Shah & Ward, 2007; Aderaw, 2019) are discussed in this section.

2.6.1 Continuous Improvement

Continuous improvement is an “improvement initiatives that increase successes and reduce failures” (Juergensen, 2000, p. 24). Furthermore, continuous improvement is defined as the ongoing effort to improve products, services or processes (Alefari, Almani & Salonitis, 2020). Continuous improvement has been considered a core element in a number of different manufacturing philosophies, including lean adoption, total quality management (TQM), employee involvement programmes, customer service initiatives, and waste reduction campaign (Singh & Singh, 2015).

Continuous improvement consists of data collection, business process improvement, benchmarking, job analysis and open communication system (Zelalem & Getachew, 2002). In the views of Bhuiyan and Baghel (2005), continuous improvement is seen more generally as a culture of sustained improvement targeting the elimination of waste in all systems and processes of an organisation. Continuous improvements help organisations progress towards an optimal production process. The intent is to revisit the improved process to ensure the proper implementation of the change, to address any variation, and to look for additional means of improving the process (Deranek, Chopra & Mosher, 2017). It has become increasingly essential to continuously improve the processes in the manufacturing industry to reduce cost and increase production efficiency without affecting the quality of products (Deranek *et al.*, 2017).

2.6.2 Customer Involvement

Alam (2006) submit that customer involvement is a major determinant in the successful development of a product or service. Customer involvement covers every contribution of a customer to all stages of developing a good or service (Fang, Lee & Yang, 2015). Customer involvement can be seen as an interface between the customers and representatives of an organisation before the creation of a good or service in order to ensure its profitability (Afunwa, *et al.*, 2020).

Klioutch and Leker (2011) argued that what is obtainable currently in the corporate world is to assign more responsibilities to customers. This means involving customers at every stage of production of a good or service, resulting to increased connection/cooperation which has proven to be beneficial to organisations and as well as the customers (Carbonell, Rodríguez-Escudero & Pujari, 2009). Chien and Chen (2010) stated that involving the customer in business activities will form a connection useful in product evolution and give the organisation a competitive edge

over other organisations. The minor way of involving customers is through their reaction and by giving opinions to the organisation while the major way of involvement is by contributing materially, expert opinion and funding towards product creation and marketing (Iruka & Ateke, 2014).

2.6.3 Customer Focus

Customer focus is largely adjudged as the most significant lean adoption principle and a well satisfied customer is the main goal in the implementation of lean adoption (Chin, Tummala & Chan, 2002). Customer focus means meeting the needs and expectations of existing and potential customers by developing a comprehensive understanding of customer needs and then delivering perceived value to customers (Sharabi, 2015).

Customer focus is fundamental to lean adoption in order to attain higher level of performance and competitive advantage (Ashraf, Jaffri, Sharif, & Khan, 2012). Customer focus help firms to produce better quality and reliable products at the right time (Sadikoglu & Oclay, 2014). Furthermore, in emphasizing the importance of customer focus, scholars (Sadikoglu & Oclay, 2014, Aderaw, 2019) submitted that i) it is used as input to improve process, ii) serve as a reference for product design, iii) a tool to get feedback on quality and deliverance performance, and iv) a source to improve quality.

Sadikoglu and Oclay (2014) opine that with a successful customer focus effort, production can be initiated with expectations, complaints, and the customers' needs as key factors. Firms should understand and determine customer needs by meeting their requirements and striving to exceed their expectations (Lewis, Pun & Lalla, 2006). Not meeting the expectations of customers can wreck an organisation (Ortner, 2000). This has made organisations to make their customers comfortable as they seek to do it more efficiently and effectively than their competitors in order to achieve their goals (Azzam, 2014). Therefore, an important requirement for lean adoption on superior performance is customer focus.

2.7 Organisational Culture

Organisational culture is a multifaceted construct with several dimensions. Organisational culture is defined as the overall pattern of attitudes, beliefs, norms and values that members of the organisation share and which form the behaviours, practices and other relics of the organisation (Sathe, 1985; Schein, 1985). Linstead and Grafton-Small (1992) defined organisational culture as "something which grows or emerges within the organisation and emphasizes the creativity of organisational members as culture-makers" (p. 32). Organisational culture is a set of major beliefs, values, norms, and assumptions shared by members of an organisation and taught to new members (Schein, 2004). Organisational culture could also be referred to as a complex mix of philosophies, commitments, traditions, and values that are shared throughout the organisation and how it affect its modus operandi as well as its overall performance, making it a potential source of advantage, advancement, and lean practices (Poskien, 2006).

As stated by Schein (2017), organizational culture is referred to as the climate and practices that an organisation creates and implement as a means to control employees. This means organisations have to develop the “right kind of culture”, a “culture of quality” or a “culture of customer service” suggesting that culture has to deal with certain values that organisations want to indoctrinate into their employees. Also, with the “right” kind of culture, there is enhanced performance in the organisation. We define organisational culture as the involvement of the aggregate workforce through adequate training and deployment of qualified personnel to effect organizational practices.

Organisational culture is one of the important factors that shape the way that things are done in an organisation (Mann, 2014). It is a key asset that facilitates the successful implementation of strategies (Zailani, Seva Subaramaniam, Iranmanesh & Shaharudin, 2015). Moreover, organisational culture is viewed as a mirror that reflects the norms and values of a firm, its employees and their behaviour (Ransom, 2018). Zheng, Yang and McLean (2010) argued that organisational culture is closely related to firm performance. Therefore, organisational culture is an explanatory variable that separates one organisation from another (Sathe, 1985; Schein, 1985).

To successfully transform towards lean adoption, organisations must develop an organisational culture, which is a time-consuming process (Bhasin & Burcher, 2006; Nordin, Deros & Wahab, 2010). Also, organisational culture has been identified as a major factor in the relationship between lean adoption and its ability to enhance operational performance (Sakakibara, Flynn, Schroeder & Morris, 1997; Nahm, Vonderembse, & Koufteros, 2004).

Wilson (2010) opined that for an organisation to be “healthy”, it must have a robust organisational culture that meets the demands of the business. According to Wilson, a robust organisational culture must possess the following characteristics i) its thoughts, beliefs, and actions must be widely accepted, acknowledged, and practiced across all levels and functions of the group, ii) its thoughts, beliefs, and actions must be in harmony with one another.

2.8 Conceptual Model

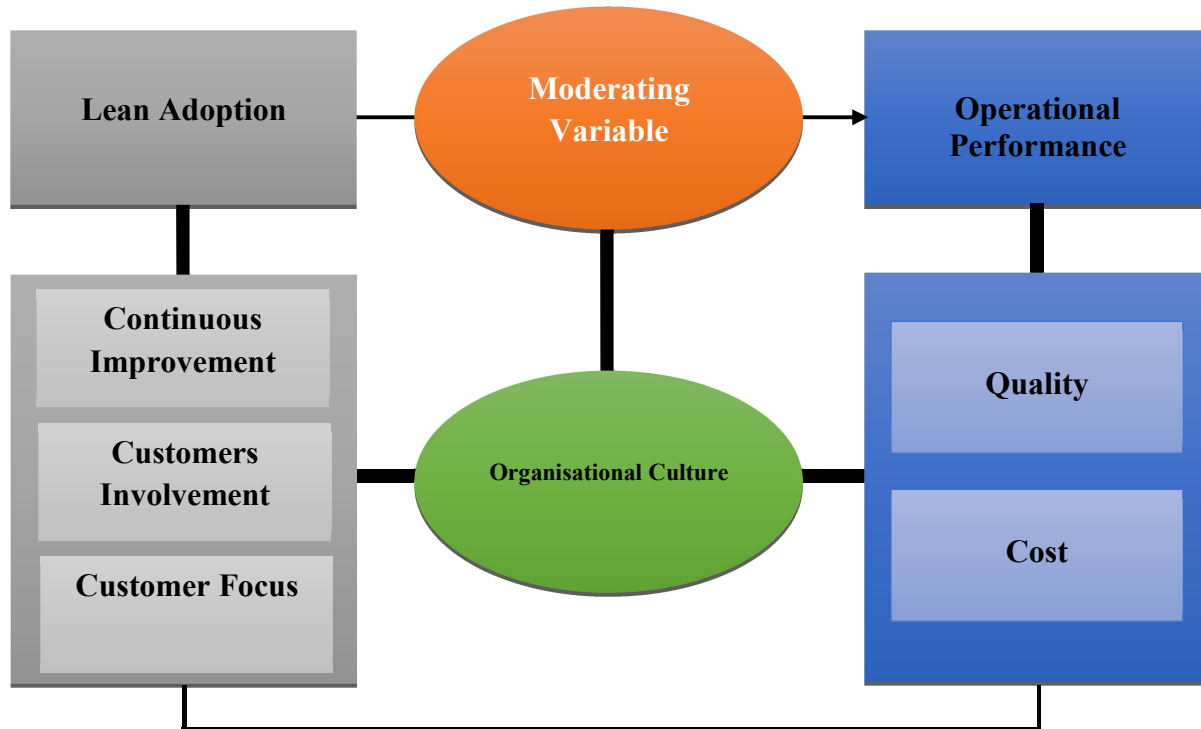


Figure 1: Conceptual Framework

Source: Lean Adoption (Continuous Improvement, Customer Involvement and Customer Focus) - (Shah & Ward, 2007; Aderaw, 2019). Organisational Culture (Wallach, 1983; Iranmanesh, Zailani, Hyun, Ali & Kim, 2019). Operational Performance (Quality and Cost) - (Saleh, 2015; Sylva, 2020).

Dimensions of Lean Adoption (Continuous Improvement, Customer Involvement and Customer Focus) were adapted from Shah and Ward (2007) and Aderaw (2019). Measures of Operational Performance (Quality and Cost) were adapted from Saleh (2015) and Sylva (2020). Moderating variable (Organisational Culture) was adapted from Wallach (1983) and Iranmanesh, Zailani, Hyun, Ali and Kim (2019).

A conceptual framework is also known as an analytical framework (Gunnell, 1969). According to Miles and Huberman (1994), a conceptual framework “explains either graphically or in a narrative form, the main things to be studied-the key factors, constructs or variable-and the presumed relationships among them. Frameworks can be rudimentary or elaborate, theory-driven, descriptive or casual” (p. 18). A conceptual framework is a “network, or “a plane,” of interlinked concepts that together provide a comprehensive understanding of a phenomenon or

phenomena” (Jabareen, 2009, p. 51). A conceptual framework “clarifies, explains and justifies methodological decisions” (Ravitch & Riggan, 2012, p. 9).

In view of the literature discussed, a conceptual model (see figure 1.1) for the manufacturing sector in Rivers State, Nigeria, presents the nexus between the dimensions of lean adoption and operational performance bounded by Organisational Culture.

A recommendation was made that this model be adopted and empirically tested in other sectors such as small and medium scales enterprises (SMEs), construction and telecommunication.

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