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ABSTRACT

Lead time as a new product development strategy has been an area of concern in many firms and especially those dealing with the fast moving goods. Studies involving lead time have been done, but this has taken place mainly in Europe. Most of the studies focused on quick packaging and intensified marketing as methods of reducing lead time. In addition to this, most studies used primary data collected through questionnaires and direct interviews. Further, research done in this area focused mainly on how time competition, reduced time and lead time as a marketing strategy may affect performance. On new product development, most of the previous research focused on financial market in relation to product development. In addition, most of them used face to face interviews except one which used questionnaires. Previous research mainly focused on customer, competitiveness and technological orientation in the process of product development. It is also clear that most of the research done in this area were mainly in European countries. With regards to improvement of the existing products, previous studies focused mostly on customer, competitiveness and technological orientation leaving out rate of change and pending changes in the process of new product development. Most of such researches have been done in European countries. Thus, there is need to conduct such a study in African countries in general and Kenya in particular. However from the review lead times affect organizational performance as per the findings of the review.

Key Words: *Lead Time, Product Development and Organizational Performance*

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INTRODUCTION

Organizations remain enterprises with goals which are achieved through defined input processes, outputs, parts and purposes for their performance. In this regard organizational performance is hinged on lead time as an ingredient of optimizing production processes and inventory management. This justified by the fact that shorter lead time and speed production, and offsite sub-assemblies can save additional time (Willy, Erika, & Amanada, 2022). In this regard quicker production, increase sales, customer satisfaction, and the company's bottom line is ascribed to shorter lead times. Long lead times involve costs upsurge due to larger buffer stocks and safety stocks and unfulfilled delivery time promises. In addition, lowering lead-times is fundamental for a product development organization (Nestor, 2022). As a result, lead times are inversely related to market shares (Munster & Vestin, 2012). Therefore, organizational performance is anchored on how effective material are managed in an organization.

Materials management is a tool to optimize performance in meeting customer service requirements at the same time adding to profitability by minimizing costs and making the best use of available resources (Goulap, Elifneh, & Belew, 2022). Lead time is a fundamental component in procurement of supplies or goods in many organizations, companies and institutions (Laizer, 2013). Majority of the companies attain significant savings from effective materials management, which amounts between 50%-60% of total costs (Song, Haas & Caldas, 2006). Effective management of materials can lead to a reduction in cost, resulting in a significant saving. These eulogizes the role of lead time on new product development and organizational performance. "Lead time" is a term borrowed from the manufacturing method known as Lean or Toyota Production System, where it is defined as the time elapsed between a customer placing an order and receiving the product ordered (Chiarini, 2012). Lead Time is the amount of time between process initiation and completion. This varies based on the customer and the product. There are four types of lead time namely; customer lead time, material lead time, factory/production lead time, cumulative lead time (Roland, 2017). Magenda, (2017) notes that there are four types of lead time namely; fixed lead time, pre-processing lead time, processing lead time and post processing lead time.

Supply chain failures involving long lead times can result in reduction of a company's revenue, dropping in market share, inflation of costs above the budget and thereby posing a threat to production and distribution (Magenda, 2017). Bowersox, (2010) adds that the main challenge for improving organizational performance is longer lead times, there are a number of reasons causing these challenges according to Bowersox (2010) such as financial requirements, need for special packaging, ocean freight scheduling and customs clearance. Moreover Bowersox (2010) notes that performance become less consistent and flexible because of longer lead times. Accordingly planning and coordination of the material flow becomes a demanding task. A conflict therefore exists, in that manufacturing systems' total lead-time are become longer while the demand for shorter delivery lead-times is increasing (Horscroft & Braithwaite, 1990; Blackburn, 2012). However, Roland, (2017) notes that reduced lead times can mean reduced inventory and more cash on hand for the businesses. In several aspects it means less risk, exposure and management of materials. Constraining the order rate from the demand side perspective is effective only when lead-time is long while it is detrimental to firms' resilience when lead time is short. Additionally, a backup supply, from a supply side perspective, reduces disruption impacts (Chang & Lin, 2019).

Nonetheless, most supply chain operations managers lack a detailed understanding of lead times' actual implications for financial performance (Stank, Pellathy, & Dittmann, 2019). Tiedemann, Wikner and Johansson (2021) also notes that lead time is an important aspect when it comes to

competing for customer orders. It is, however, difficult to assess the value of lead time. However, studies focusing on the lead time, new product development and organization performance remain sparse. Therefore, the review focuses on:

- Effect of lead time on organizational performance
- Effect of lead time on new product development

EMPIRICAL LITERATURE REVIEW

Effect of Lead Time on Performance

Lead Time is the time that elapses from the moment a part enters the factory as a raw material or component until it leaves it as part of the final product; therefore, any reduction of this time as well as of the possible waste in its management represents an improvement in the company's productivity and in the efficiency of its manufacturing processes (Itemsa., 2023). Reducing lead times is a way to diminish the average inventory levels. Financial benefits are also achieved by the organization with project lead time reductions that focus on cost savings (de Toledo, da Silva, & Forcellini, 2017). In this regard a number of today's companies have created global strategies to source raw materials, components and labor from low-cost countries (Ballou, 2004; Bowersox, 2010), which are often located far from the countries where they will be used. This means that they can have more options for selecting supplies and negotiate lower piece prices. By that they hope to achieve competitive advantages and secure supply sources (Waters, 2011). Common business strategies influencing global operations are, for example, aiming for economies of scale by optimization of manufacturing size or cross-border mergers spreading operations over a large number of countries (Waters, 2011). According to the World Trade Organization world trade is growing faster than the gross national product in most countries and most probably will continue to do so for the predictable future (Khan, Christopher, & Burnes, 2008). Thereby, the complexity and expansion of companies keeps increasing continuously as well.

One of the key business considerations for companies is reaching a balance between supply and demand (Khan, Christopher, & Burnes, 2008). and thereby increasing its profitability. Thus, for optimizing the performance of the firm, product availability has to be met exactly with the customer requirements. As Lysons (2007) suggests, an important concern in the interest of performance is the short lead time. For example, to lower the risk of poor performance, lead time uncertainty must be looked upon in meeting the sudden changes in demand and hedging against foreseen shortages and new product fluctuations (Lysons & Farrington, 2020). Hereby it could be said that there exist, both, benefits and disadvantages in lead time – from one hand it protects companies against unforeseen fluctuations for better performance, but from the other hand lead time require high capital involvement, which reduces the financial efficiency. That the marginal value of time in a supply chain is surprisingly low; it generally falls within a range of 0.4–0.8% of product unit cost per week (Blackburn, 2012).

The increased distance from suppliers and complexity of logistics in companies tends to create longer order lead times and higher inventory levels. Meanwhile in companies that practice cost efficient philosophies the goal is to move towards reduced lead times and elimination of excess stock levels. Therefore, it creates a challenging task for the logistics to accomplish both goals. (Rushton, 2006) It has to be considered carefully whether the benefits gained by long distance sourcing go beyond the challenges caused by it. Griffith (2001) investigated the relationship between new product development lead time competition and productivity levels and growth rates in Europe using panel data on UK establishments over the period 1980-1996. The results suggest that the increase in new product development lead time competition brought about by small medium enterprises led to an increase in overall levels of efficiency and growth

rates. A study was conducted by Kiumarsi (2014) on lead time as a marketing strategy to improve the sales of bakery products of small-medium enterprise (SMEs) in Malaysia. Findings revealed that SMEs had unstructured lead time strategy and needed enhancements in the areas of packaging, value add to the bakery products, focus on promotion and appropriate advertising. Further, the analysis revealed that more coverage of lead time for bakery products may definitely improve the performance of bakeries.

Odoyo (2014) conducted a study on the challenges of lead time for new products developed by Rift Valley Bottlers in Uasin-Gishu County, Kenya using case study design. The study concluded that lead time factor determines whether the product will be bought or not in the market. It also recommended that organizations should consider reducing lead time so as to ensure better performance.Miller and Cardinal (2012) employed a meta-analytic approach using data from 26 previously published studies and concluded that lead time positively influences firm performance. Caeldries and Van Dierdonck (2000) surveyed 82 Belgian Business firms and reported a link between lead time strategy and performance. They noted that lead time enables a firm to strengthen its competitive position, and facilitates integration and coordination of members' behavior. Pealtie (2003) observed that the main reason for the introduction of formalized and fastened lead time is to improve company performance through the satisfaction of timely customer needs. Imoisili (1978), studying indigenous and multinational companies in Nigeria, concluded that the more effective companies are found among organizations which maintain consistency between environmental perception and management practices, do long-term planning, use more flexible control systems and have shorter lead time. Fubara (2006) did a survey in Nigeria and observed that companies that have efficient lead time experienced growth in profits. Tiedemann, Wikner & Johansson (2021) investigated Understanding lead-time implications for financial performance: a qualitative study. The findings were that the length of and uncertainty in Strategic lead times have implications for companies' financial performance.

Effect of Lead time on new product development

According to Ebarefimia (2014) new products are the life blood of companies, large or small. Proficiency in new product development can contribute to the success of many companies. If companies can improve their efficiency at launching new products, they could double their bottom line. It is necessary that companies developed new products to replace those that have become outdated or introduce completely new products that will be captivating before larger market. According to Zhan, Tan, Chung, Chen, and Xing, (2020), new product development is a fundamental process for an enterprise and constitutes a basic source for revitalizing and improving firm's competitive advantage new product development (NPD) is a dynamic process, which requires the combination and exploitation of all the enterprise capabilities, in order for a new product with unique characteristics which will satisfy market needs to be produced (Marsh & Stock, 2003). In manufacturing, lead time often represents the time it takes to create a product and deliver it to a consumer (Kenton, 2022).

Bryson and Lombardi, (2009) argue that NPDS assists in providing direction so that the customers have a wide variety of choice. Kaunda, (2017) argues that NPDS allows an organization to be more proactive than reactive in shaping its own future, initiate and influence rather than just respond to activities, and thus to exert control over its destiny. It assists in highlighting areas requiring attention or innovation. Scheff and Kotler (1996) argues that NPDS planning process can be used as a means of repositioning and transforming the organization. Thompson, Strickland and Gamble (2007) postulate that the essence of good PD making is to build a market position strong enough and an organization capable enough to produce successful performance despite unforeseeable events, potent competition, and internal difficulties. Indeed Ohmae (2003)

contends that NPDS enables a company to gain, as effectively as possible, a sustainable edge over its competitors. Greenley (2006) points out that a range of potential benefits to intrinsic values accrues to both the company and external stakeholders if new products are developed. In manufacturing, lead time often represents the time it takes to create a product and deliver it to a consumer (Kenton, 2022). Longer lead times can also drive-up opportunity costs.

Close supplier relationships have contributed significantly to NPD lead time reduction (Clark & Fujimoto, 1991). This suggests the strong supplier relationships that support lead time reduction in JIT also support development time reduction New Product Development Using Simultaneous Engineering (NPDSE). Graban (2022) notes that Just in Time" (JIT) Should Be Called "Short Lead Time" (SLT) Supply Chains.Using existing JIT and new product development data since the early 1980s, Meybodi, (2003) showed that success in JIT has a positive impact on new product development. To understand the relationships between JIT and NPDSE, one has to examine carefully the two fundamental principles of waste elimination and respect for people in a JIT system (Cook & Rogowski, 1996). Meybodi., (2005) the impact of just-in-time practices on new product development: a managerial perspective in the USA. The survey data strongly support the hypotheses that successful JIT organizations will design new products with fewer design changes, less development time, better competency, less development cost and less manufacturing cost. Clark and Fujimoto, (1989) studied Lead time in automobile product development explaining the Japanese advantage. The results suggest that different factors influence planning and engineering: product innovation and project scope affect planning lead time, while process innovation and organizational capability affect engineering lead time. Overall, we find that the real lead time advantage of the Japanese is on the order of 12 months.

In some cases, companies can improve lead times by implementing automated stock replenishment and just-in-time (JIT) strategies (Kenton, 2022). JIT shortens manufacturing time, which decreases lead times for customers. Reduce Product Defects: Production mistakes can be spotted faster and corrected, which results in fewer defective products (Jenkins, 2023). JIT is a methodology that emphasizes speed, quality, and efficiency. It is based on the principle of "just in time" production, which means that products are only produced when needed; this eliminates waste and allows companies to respond quickly to customer demands. JIT delivery by suppliers improves cost performance while JIT link with customers increases new product performance and speed-to-market performance (Shou, Shan, & Li, 2022). JIT is not a panacea for all market challenges. Nonetheless, strong evidence of JITs substantial benefits merits its consideration as part of organizational strategy to enhance long-run performance and competitiveness (Uma, Rajiv, & Karippur, 2017).

CONCLUSIONS AND RECOMMENDATIONS

From the literature review conducted, most of the previous research focused on financial market in relation to product development. In addition, most of them used face to face interviews except one which used questionnaires. Previous research mainly focused on customer, competitiveness and technological orientation in the process of product development. It is also clear that most of the research done in this area were mainly in European countries. Besides Previous studies on improvement of existing products on performance focused mostly on customer, competitiveness and technological orientation leaving out rate of change and pending changes in the process of new product development and lead time. Most of such research has been done in European countries. Thus, there is need to conduct such a study in African countries in general and Kenya in particular on lead time, new product development and organizational performance. Tiedemann, Wikner & Johansson (2021) investigated Understanding lead-time

implications for financial performance: a qualitative study. The findings were that the length of and uncertainty in Strategic lead times have implications for companies' financial performance. These implications vary in strength and can be either direct or indirect. Published studies focus on reducing and compressing lead times to increase profit Kiumarsi (2014) (Odoyo (2014); Miller & Cardinal (2012). In contrast, it might sometimes be more profitable to prolong lead times, such as when less costly materials can be sourced from low-cost countries (Blackburn, 2012). Besides the use of strategic lead-times, in which each section can be prolonged, reduced or kept unchanged for increase profitability.

However lead time affects both new product development and organizational performance. This underscores that in a competitive market with changing customer demands and rapid technological advance, a lead time gap of that magnitude is competitively significant. The study is nevertheless subject to limitations and provides opportunities for further research. The presented array of lead times implications for organizational performance is not exclusive, and the authors welcome further studies where the strength of the implications could be further investigated. Besides there is need for further investigation on the effect of lead time in the context of developing countries. Additionally, it would be interesting to substantiate the findings in the context of environmental and social sustainability (i.e. the triple bottom line).

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