Cost Control Improvements through Learning Curve Theory in Small Scale Manufacturing Companies in Nigeria

Gilbert Ogechukwu Nworie[1], Grace Uchechi Obi[2]
[1-2]Nnamdi Azikiwe University, Awka, Anambra State, Nigeria.
Email Addresses: [1]dulcisgil@gmail.com, [2]gu.obasi@unizik.edu.ng

DOI: 10.56201/jbae.v10.no2.2024.pg62.76

Abstract
The study examined whether cost control improvements can be achieved by applying learning curve theory in small scale manufacturing firms in Nigeria. The specific objective was to determine the extent to which production team expertise and product quality control enhance cost savings among small scale manufacturing firms in Nigeria. The study adopted descriptive survey design on a population of 493 strategic management staff working full time in small scale manufacturing companies in Nigeria. Taro-Yamane (1964) formula for sample size was used to obtain a sample size of 221 respondents that participated in the survey. Primary data were collected using electronic questionnaires administered to 221 staff of the study sample. The two (2) null hypotheses that were formulated were tested using Spearman Correlation Coefficient with the aid of Statistical Package for Social Sciences (SPSS) V. 25. The study found that: production team expertise significantly contributes to cost savings among small scale manufacturing firms in Nigeria (p-value = 0.000); product quality control significantly influences cost savings among small scale manufacturing firms in Nigeria (p-value = 0.000). In conclusion, developing production team expertise, and focusing on product quality control enable firms to enhance their cost control efforts. The study recommends that small scale manufacturing firms should invest in training and development programs to enhance the expertise and skills of production teams in manufacturing firms in Nigeria as well as provide opportunities for team members to learn about process optimization, waste reduction, and resource utilization.

Keywords: *Learning Curve Theory, Cost Control, Production Team Expertise, Product Quality Control, Cost Savings*

1.0 INTRODUCTION

In both individual and organizational settings, achieving optimal efficiency and proficiency remains a critical challenge. While learning curve theory holds that efficiency of an organization improves with the repetition of a task over time, it is still a recurring question in literature about whether the time cost per unit decreases as the number of repetitions or the volume of production increases (Boone, Elshaw, Koschnick, Ritschel & Badiru, 2021). As today's business environment continue to change per time, without a comprehensive and strategic application of learning curve effect, organizations time and again struggle to achieve significant cost reductions and efficiency gains. This gap highlights the necessity for systematic research and implementation strategies to harness the potential benefits of repetitive task performance, ultimately driving better productivity and cost-efficiency outcomes.

Manufacturing firms in Nigeria, like their counterparts worldwide, operate in a highly competitive and dynamic business environment (Odieli & Agari, 2023; Idigo, 2023). To remain relevant and sustainable in the long term, these firms continually strive to enhance their operations and profitability. A crucial aspect of achieving this goal is cost control (Ezeagba, 2014). Cost control involves managing expenses to ensure they remain within acceptable limits and the entity operates efficiently (Adegbie & Fadere, 2020). This process entails analyzing all costs associated with production and identifying areas for reduction without compromising product or service quality (Husein, Khalifa, & Elkarim, 2016). Manufacturing firms in Nigeria face numerous challenges that can impact their profitability and long-term viability (Idigo, 2023). These challenges include inadequate funding, high operating costs, intense competition, and fluctuating market conditions. Implementing effective cost control measures can help address some of these issues by identifying and eliminating inefficiencies, reducing waste, and enhancing overall performance (Oyedokun, Tomomewo & Owolabi, 2019).

Effective cost control measures allow firms to optimize their resources, minimize waste, and increase their competitiveness in the market (Aggreh, Abiahu & Nworie, 2023; Oyedokun, Tomomewo & Owolabi, 2019). The learning curve theory is a valuable concept for cost control in Nigerian manufacturing firms. This theory suggests that the time required to complete a task decreases as the task is performed more frequently (Mohr & van Rijn, 2022). Applying this theory can help firms streamline their processes, improve efficiency, and further reduce costs. In other words, as workers become more familiar with a particular task or process, they become more efficient in performing it (Ugulu & Allen, 2018). The learning curve theory has several implications for cost control in manufacturing firms in Nigeria. First, it suggests that as workers become more experienced in performing a task, they become more efficient, which can lead to a reduction in the cost of production (Boone et al., 2021). This can help manufacturing firms to improve their profitability and competitiveness in the market.

In addition, the learning curve theory suggests that companies can improve their operational efficiency by investing in employee training and development programs (Steven, 2010). By providing workers with the necessary skills and knowledge to perform their tasks efficiently, companies can reduce the learning curve and achieve cost savings (Ugulu & Allen, 2018). The learning curve theory can also be applied to the development and implementation of new products or processes (Mohr & van Rijn, 2022). In the context of manufacturing, this means that as workers become more experienced in performing a particular task or process, they become more efficient and produce more output in less time. This efficiency gain can be harnessed to improve cost ascertainment and management, leading to increased profitability (Aduba, 2021). However, variations in task complexity, employee turnover, and inconsistencies in training and process optimization can hinder the anticipated improvements in efficiency. Consequently, the expected cost reductions and efficiency gains are not always realized, and the theory's potential benefits remain largely theoretical rather than practical. Additionally, manufacturing firms that lack the necessary organizational structures, such as production team expertise, struggle to implement effective cost control measures, which often leads to poor product quality control.

Related studies that have previously examined similar issue did not specifically determine whether production team expertise alongside product quality control influence cost savings among manufacturing firms in Nigeria. This study is being carried out to address this gap in knowledge. The broad objective of the study is to examine whether cost control improvements

can be achieved by applying learning curve theory in small scale manufacturing firms in Nigeria. The specific objectives are:

1) To examine the extent to which production team expertise contributes to cost savings among small scale manufacturing firms in Nigeria.

2) To ascertain the degree to which product quality control enhances cost savings among small scale manufacturing firms in Nigeria.

2.0 LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Learning Curve

The concept of the learning curve has been widely used in various industries and fields of study (Ugulu & Allen, 2018). The learning curve theory states that as individuals or organizations engage in repetitive tasks or activities, they become more efficient and productive, and the cost of performing the task decreases (Aduba, 2021). This is because as individuals or organizations gain experience, they learn to work more efficiently and effectively, which results in a reduction in the amount of time and effort required to complete each subsequent task (Abam & Nsien, 2022). The learning curve theory has implications for various aspects of cost management, including pricing, resource allocation, and production planning. For example, companies can use the learning curve to inform decisions about pricing by understanding the impact of experience on the cost of producing a product (Ugulu & Allen, 2018). As a company gains experience, it becomes more efficient, which leads to a reduction in the cost of producing each unit. This, in turn, allows the company to lower its prices, which can result in increased sales and profits. Resource allocation decisions can also be informed by the learning curve theory. Companies can use the theory to determine the optimal level of resources needed to produce a certain quantity of a product. As the company gains experience and becomes more efficient, it may require fewer resources to produce the same amount of product. This means that the company can allocate its resources more effectively, which can result in cost savings and improved productivity (Boone et al., 2021).

Production planning decisions can also benefit from the learning curve theory. By understanding the impact of experience on the cost of producing a product, companies can plan their production schedules more effectively (Mohr & van Rijn, 2022). For example, companies can use the learning curve to determine the optimal order size for a particular product. If the company is still in the early stages of production, it may be more efficient to produce a smaller quantity of the product, as this will allow it to gain experience and improve its efficiency (Steven, 2010). As the company gains experience, it can gradually increase the order size, which can lead to lower costs and improved profitability (Aduba, 2021). In conclusion, the learning curve theory is a powerful tool for cost management (Mohr & van Rijn, 2022).

2.1.1.1 Production Team Expertise

Production team expertise refers to the knowledge, skills, and experience of the individuals involved in the production process (Teodoridis, 2018). The expertise of the production team can have a significant impact on the quality, efficiency, and cost-effectiveness of the production process (Aduba, 2021). A production team with a high level of expertise is better equipped to identify and implement improvements that can reduce costs and increase efficiency (Boone et al., 2021). For example, experienced team members may have a better understanding of how

to optimize production processes and workflows, and they may be able to identify and resolve issues more quickly and effectively than less experienced team members.

In addition, a highly skilled production team can also help to ensure the quality of the products or services being produced. Experienced team members are often more familiar with the equipment and processes involved in production, which can help to reduce errors and ensure that products are produced to the highest possible standard (Ross, 2011). To develop a highly skilled production team, companies may invest in training and development programs that help team members to build their skills and expertise (Aduba, 2021). Training programs may focus on a range of topics, including production processes, equipment operation, quality control, and safety procedures. By investing in training and development, companies can help to ensure that their production team is equipped with the knowledge and skills needed to perform their jobs to the highest possible standard (Teodoridis, 2018). Generally, production team expertise is a critical component of cost management. By building a team with a high level of expertise, companies can improve the efficiency and effectiveness of the production process, reduce costs, and ensure the quality of the products or services being produced.

2.1.1.2 Product Quality Control

Product quality control is a critical process that involves monitoring and evaluating the quality of products or services produced, to ensure that they meet established standards (Kuo, 2006). The goal of quality control is to identify and address any defects or issues that could impact the performance or reliability of the product, and to ensure that it meets the expectations of the customer (Mitra, 2016). Effective quality control can have a significant impact on cost management (Anderson, Santos, Hildenbrand & Schug, 2019). By identifying and addressing defects or issues early in the production process, companies can reduce the costs associated with rework, customer returns, and warranty claims. In addition, by producing high-quality products or services, companies can improve customer satisfaction and loyalty, which can lead to increased sales and revenue.

There are several key steps involved in effective product quality control. These include:

1. Setting quality standards: Companies need to establish clear quality standards that define the characteristics and performance requirements of their products or services.

2. Inspection and testing: Products or services need to be inspected and tested at various stages of the production process to ensure that they meet the established quality standards. This may involve visual inspections, performance testing, or other types of evaluation.

3. Corrective action: If defects or issues are identified, corrective action needs to be taken to address the problem. This may involve reworking the product, replacing defective components, or making changes to the production process to prevent similar issues from occurring in the future (Perrot, Ioannou, Allais, Curt, Hossenlopp & Trystram, 2006).

4. Continuous improvement: Quality control is an ongoing process that requires continuous monitoring and evaluation. By tracking and analyzing quality control data, companies can identify areas for improvement and implement changes to improve the efficiency and effectiveness of the production process (Anderson, Santos, Hildenbrand & Schug, 2019).

Generally, product quality control is a critical component of cost management. By ensuring that products or services meet established quality standards, companies can reduce the costs associated with defects, rework, and customer returns, while also improving customer satisfaction and loyalty.

2.1.2 Cost Control

Cost control is the process of managing expenses in a business entity in order to ensure that they are within acceptable limits and that the entity is operating efficiently (Adegbie & Fadere, 2020). It involves analyzing all the costs associated with the production process and identifying areas where they can be reduced without negatively impacting the quality of the product or service provided (Oyedokun, Tomomewo & Owolabi, 2019). Effective cost control can help businesses to improve their financial performance, increase profitability, and remain competitive in the market. In today's highly competitive business environment, cost control has become an essential part of every business strategy.

One of the major challenges in cost control is to strike a balance between reducing costs and maintaining the quality of products or services (Nworie & Nwoye, 2023). Therefore, businesses need to be strategic in their approach towards cost control. This is where the concept of strategic cost management (SCM) comes into play (Alsoboa, Ali & Joudeh, 2015). In conclusion, cost control is a critical aspect of business management that can contribute significantly to the success of a business (Adegbie & Fadere, 2020). Effective cost control requires a strategic approach that is aligned with the overall business strategy (Lawal, 2017). By implementing SCM techniques, businesses can achieve cost savings while maintaining the quality of their products or services, which can ultimately lead to increased profitability and competitiveness.

2.1.2.1 Cost Saving

Cost savings refer to the reduction of expenses incurred by a company, resulting in increased profitability and financial stability. Cost savings can also be defined as the process of cutting down on unnecessary costs, streamlining processes and resources, and improving efficiency to reduce the overall cost of doing business (Adigbole & Osemene, 2019). In accounting terms, cost savings are the difference between the actual cost incurred and the expected cost, resulting in a positive variance that reflects effective cost management (Adegbie & Fadere, 2020).

The concept of cost savings also refers to the benefits of negotiating better prices for raw materials or services, resulting in a lower total cost of production without sacrificing quality or performance. It is often seen as a strategic approach to managing expenses, where companies continuously identify and implement cost-saving measures to optimize resources and improve the bottom line (Adigbole & Osemene, 2019). Cost saving is a crucial element of cost management, as it involves any action or strategy that reduces the total cost of producing a product or providing a service, without sacrificing quality or performance (Nworie & Nwoye, 2023). Effective cost-saving measures can help companies to increase profitability, remain competitive in their market, and reinvest resources in growth and innovation.

2.2 Theoretical Framework

2.2.1 Experience Curve Theory

The experience curve theory, also known as the learning curve theory, was first introduced by Theodore Levitt in his 1962 Harvard Business Review article "The Marketing Imagination." The theory suggests that as the volume of production increases, the cost per unit decreases. This phenomenon occurs because workers become more skilled and efficient through repetition

and experience, which leads to fewer errors, less wasted materials, and faster production times (Steven, 2010). Levitt's theory was based on observations made during World War II, where it was noticed that the cost of producing airplanes decreased as the number of planes produced increased. Levitt argued that this pattern could be applied to other industries as well, and that companies could use this insight to gain a competitive advantage by achieving economies of scale.

Experience curve theory proposes that the more an individual or organization performs a particular task or activity, the more they learn and become proficient at it, resulting in increased efficiency and productivity (Aduba, 2021). This theory suggests that as experience accumulates, the cost and time required to complete each subsequent task decrease (Ugulu & Allen, 2018). The experience curve theory is widely applicable across various industries and activities, including manufacturing, service, and technology (Abam & Nsien, 2022). For example, in the manufacturing industry, a company that produces a particular product repeatedly over time will become more efficient and effective at producing that product, resulting in reduced production costs per unit. Similarly, in the service industry, employees who have more experience in a particular role will likely be more productive and require less training than new employees.

The theory can inform decisions related to pricing, resource allocation, and production planning (Ugulu & Allen, 2018). For instance, companies that can produce a product more efficiently due to experience can lower their prices, which may lead to an increase in market share (Steven, 2010). Resource allocation can be optimized by assigning experienced individuals to tasks that require greater efficiency or that are more critical to the success of the organization (Aduba, 2021). Production planning can be improved by using experience curve analysis to forecast future costs and production volumes. In summary, experience curve theory suggests that as individuals or organizations gain experience in a task or activity, they become more efficient and productive (Boone et al., 2021), resulting in reduced costs and time required to complete each subsequent task (Abam & Nsien, 2022). The theory has broad applicability across industries and activities and can inform decisions related to pricing, resource allocation, and production planning. This justifies the adoption of the theory in the study.

2.3 Empirical Review

Nworie and Nwoye (2023) evaluated how selected firms' costs predict the directionality of operating profits for publicly listed consumer goods firms in Nigeria. The research assessed the effect of selling and distribution costs, inventory costs, and labor costs on the operating profit ratio of the sampled firms. Utilizing an ex-post facto research design, the study purposively sampled 13 consumer goods firms from a population of 20 listed on the Nigerian Exchange Group. Secondary data from the firms' 2011-2020 annual reports were analyzed using descriptive statistics, correlation analysis, and ordinary least square regression at a 5% significance level. The findings revealed that inventory costs positively affect the operating profit ratio but are not significant, labor costs positively and significantly influence the operating profit ratio, and selling and distribution costs negatively but insignificantly impact the operating profit ratio of the sampled firms.

Hogan et al. (2022) examined whether Boone's learning curve systematically reduces error in modeling observed learning curves using production data from 169 Department of Defense end-items. High variability in error reduction precluded conclusive evidence on the extent

Boone's learning curve reduced error on average, highlighting the need for a diminishing learning rate forecasting model to address this variability.

Aduba (2021) analyzed technological learning and the learning curve in Nigerian financial institutions, specifically examining whether a bank's experience reduces both the cost of credit and enhances value creation. Using data from Nigerian commercial banks' income statements and balance sheets, the study found that bank experience significantly improves cost efficiency in credit creation and adds gross value to the economy.

Boone et al. (2021) investigated production cost estimates to identify and model modifications to a prescribed learning curve. A new model was created allowing for a "flattening effect" later in the production process. Compared to Wright's learning curve, the new model showed a statistically significant reduction in error, measured by Sum of Squared Errors and Mean Absolute Percentage Error.

Oyedokun, Tomomewo, and Owolabi (2019) examined the effect of cost control on the profitability of selected manufacturing companies in Nigeria using an ex-post facto research design. Focusing on five companies listed in the consumer goods sector of the Nigeria Stock Exchange from 2005-2017, the study found a significant negative association between the cost of raw materials and profit before tax, concluding that cost control positively affects profitability.

Kanthana (2018) investigated the effects of cost management quality on internal control effectiveness and decision-making reliability in Thai industrial firms. Using a descriptive survey design, the study found that cost management quality positively relates to internal control effectiveness and decision-making reliability, which in turn positively impact firm performance.

Lawal (2017) studied the impact of cost control and cost reduction on the organizational performance of Chemster Paints Industry in Nigeria. Using a survey descriptive research design, the study found that both cost control and cost reduction positively affect organizational performance.

Lasisi and Nuhu (2015) examined the impact of cost control on the survival of firms in Nigeria using a survey descriptive research design. The study found that a majority of respondents agreed that cost control impacts profitability, recommending Just-in-Time (JIT) techniques for meeting production and sales requirements.

Kinyugo (2014) studied the effect of cost efficiency on the financial performance of companies listed on the Nairobi Securities Exchange in Kenya. The study found a significant positive relationship between Return on Assets and efficiency, indicating that cost efficiency positively affects the financial performance of listed companies.

Ukpai and Akenbor (2007) evaluated the effectiveness of the learning curve theory in price quotations for construction firms. Their study, involving chief accountants in the construction industry, found that the learning curve effect reduces labor and operational costs, leading to lower contract prices and a competitive edge. They recommended eliminating challenges to enhance the theory's effectiveness in the industry.

3.0 METHODOLOGY

The study adopts descriptive survey design in order to examine the implications of learning curve theory in cost control in small scale manufacturing firms in Nigeria. Descriptive survey design is an appropriate research method for collecting data from a representative sample of a population to describe a particular phenomenon or situation. The use of a descriptive survey design is justified as it allows for the collection of diverse opinions and perspectives from participants. The research design also enables the researchers to gather data on the current state of affairs and the relationships that exist between variables of interest. The population of this study was made up of 493 strategic management staff working full time in small scale manufacturing companies in Nigeria. From the population of 493, Taro-Yamane (1964) formula for sample size was used to determine the sample size of the study. The computation is as follows:

$$\boldsymbol{n = \frac{N}{1+N\,(e)^2}}$$

Where:

n - Sample size

N - Population size

e - The level of precision, sometimes called sampling error, is the range in which the true value of the population is estimated to be.

1 - Constant

Therefore;

Substituting the values in the formula where *e* = 5% we have:

N = 493

e = 0.05

n = ?

$$n = \frac{493}{1+493(0.05)^2}$$

$$n = \frac{493}{1+493(0.0025)}$$

$$n = \frac{493}{1+1.2325}$$

$$n = \frac{493}{2.2325}$$

n = 220.8287

Approximately, n = 221

This study deployed primary data that were obtained first hand by the researcher on the field. The primary source of data used in this study was generated mainly with the aid of a structured questionnaire. The researcher collected raw data from questionnaires administered to 221 staff of the study sample. The reliability is traced to how consistent the measuring instrument gives the same or similar answer. Cronbach's alpha was used to determine the reliability of the

research instrument. Table 3.1 below gives the Cronbach's alpha reliability coefficients for the research instrument.

Table 3.1 Reliability Coefficients of the Variables

Constructs	Number of Items	Cronbach's alpha
1. Effect of Learning Curve Theory and cost Control	12	α = .857

Source: Researcher's Computation using SPSS V 25, 2024

According to Table 3.1, the reliability coefficient of the research instrument is above 0.7, which, as recommended by Onyeizugbe (2017), indicates that the instrument is reliable. Therefore, based on this criterion, the data collection instrument was considered reliable. The analysis of data was obtained using descriptive statistics such as percentage analysis, mean, standard deviation and frequency distribution tables. The four (4) null hypotheses that were formulated were tested using Spearman Correlation Coefficient with the aid of Statistical Package for Social Sciences (SPSS). The choice of this technique of hypothesis testing is deemed appropriate since the data gathered are ordinal numbers. The choice of Spearman Ranked Order Correlation as a tool for hypothesis testing is appropriate because the data gathered in the study are ordinal numbers. Spearman Ranked Order Correlation is a statistical tool that measures the strength and direction of the relationship between two variables when the data are ordinal. It is a non-parametric test that does not require the assumption of normality, and it is suitable for analyzing data that violate the assumptions of normality or linearity.

4.0 DATA ANALYSIS

4.1 Presentation of Data and Descriptive Statistics

Table 4.1 Presentation of Response Rate

Item	Frequency	Percentage
Validly filled	206	93.2
Unreturned	15	6.8
Total	221	100

Source: Field Survey, 2024

Table 4.1 presents the response rate for the study, indicating the number of validly filled and unreturned questionnaires. According to the table, out of a total of 221 questionnaires distributed, 206 of them were filled out correctly and returned, representing 93.2% of the total sample. These validly filled questionnaires provide valuable data for the study. On the other hand, 15 questionnaires were not returned, which accounts for 6.8% of the total sample. These unreturned questionnaires were not included in the analysis and did not contribute to the data collected.

4.2. Analysis of Research Questions

Table 4.2 Analysis of Research Questions

S/N	Production Team Expertise	SA	A	N	D	SD	Mean	Remark
1	Manufacturing firms with highly skilled production teams are better positioned to achieve cost savings.	44	83	32	25	22	3.50	Accept
2	Production team expertise plays a vital role in optimizing production processes and reducing costs.	38	81	29	37	21	3.38	Accept
3	Well-trained production teams can identify and implement process improvements that lead to cost savings.	57	59	40	24	26	3.47	Accept
4	The expertise of the production team contributes to minimizing wastage and maximizing resource utilization, resulting in cost savings.	31	83	30	42	20	3.31	Accept
S/N	**Product Quality Control**	**SA**	**A**	**N**	**D**	**SD**	**Mean**	**Remark**
5	Effective product quality control measures contribute to cost savings in manufacturing firms.	44	83	26	25	28	3.44	Accept
6	Ensuring high product quality minimizes rework, scrap, and customer returns, resulting in cost reductions.	37	86	22	44	17	3.40	Accept
7	Implementing rigorous quality control measures reduces the risk of producing defective products, thereby avoiding additional costs.	101	26	30	13	36	3.69	Accept
8	Product quality control initiatives lead to enhanced customer satisfaction, repeat business, and overall cost savings for manufacturing firms	44	80	36	26	20	3.50	Accept
S/N	**Cost Saving**	**SA**	**A**	**N**	**D**	**SD**	**Mean**	**Remark**
9	Cost savings are a key objective for manufacturing firms to maintain competitiveness and profitability.	38	74	29	45	20	3.32	Accept
10	Implementing cost-saving measures allows manufacturing firms to allocate resources more efficiently.	44	83	32	25	22	3.50	Accept
11	Continuous efforts to identify and eliminate unnecessary costs contribute to long-term cost savings.	62	59	31	36	18	3.54	Accept
12	Manufacturing firms that prioritize cost savings can achieve a competitive advantage by offering products at lower prices while maintaining profitability.	32	92	40	28	14	3.49	Accept

Source: Field Survey, 2024

Based on the data provided in Table 4.2, the research questions were analysed using frequency counts and mean point analysis.

Production Team Expertise: According to the respondents, manufacturing firms with highly skilled production teams are better positioned to achieve cost savings (Mean: 3.50). They also agreed that production team expertise plays a vital role in optimizing production processes and reducing costs (Mean: 3.38). The respondents believed that well-trained production teams can identify and implement process improvements that lead to cost savings (Mean: 3.47). Additionally, the expertise of the production team contributes to minimizing wastage and maximizing resource utilization, resulting in cost savings (Mean: 3.31).

Product Quality Control: The respondents agreed that effective product quality control measures contribute to cost savings in manufacturing firms (Mean: 3.44). They also believed that ensuring high product quality minimizes rework, scrap, and customer returns, resulting in cost reductions (Mean: 3.40). Additionally, implementing rigorous quality control measures reduces the risk of producing defective products, thereby avoiding additional costs (Mean: 3.69). Lastly, product quality control initiatives lead to enhanced customer satisfaction, repeat business, and overall cost savings for manufacturing firms (Mean: 3.50).

Cost Saving: The respondents agreed that cost savings are a key objective for manufacturing firms to maintain competitiveness and profitability (Mean: 3.32). They also believed that implementing cost-saving measures allows manufacturing firms to allocate resources more efficiently (Mean: 3.50). Continuous efforts to identify and eliminate unnecessary costs were seen as contributing to long-term cost savings (Mean: 3.54). Additionally, manufacturing firms that prioritize cost savings can achieve a competitive advantage by offering products at lower prices while maintaining profitability (Mean: 3.49).

4.3 Test of Hypotheses

The null hypotheses that were formulated were tested using Spearman Correlation Coefficient with the aid of Statistical Package for Social Sciences (SPSS) V. 25.

4.3.1 Test of Hypothesis I

H_0: Production team expertise does not significantly contribute to cost savings among small scale manufacturing firms in Nigeria.

Table 4.3 Correlational Test for Hypothesis I

Spearman's rho		Cost Saving
Production Team Expertise	Correlation Coefficient	.542**
	Sig. (2-tailed)	.000
	N	206

Source: SPSS 25 Output

The correlational test results in Table 4.3 demonstrate that there is a statistically significant positive correlation between production team expertise and cost savings among the small scale manufacturing firms in Nigeria. The correlation coefficient (Spearman's rho) is 0.542, indicating a moderate positive relationship. The p-value (Sig. 2-tailed) is 0.000, which is less than the conventional significance level of 0.05. This suggests that the correlation between production team expertise and cost savings is statistically significant. Therefore, the alternate

hypothesis was accepted that production team expertise significantly contributes to cost savings among small scale manufacturing firms in Nigeria (p-value = 0.000).

4.3.2 Test of Hypothesis II

H_0: Product quality control does not significantly enhance cost savings among small scale manufacturing firms in Nigeria.

Table 4.4 Correlational Test for Hypothesis II

Spearman's rho		Cost Saving
Product Quality Control	Correlation Coefficient	.526**
	Sig. (2-tailed)	.000
	N	206

Source: SPSS 22 Output

The correlational test results in Table 4.4 reveal that there is a statistically significant positive correlation between product quality control and cost savings among the small scale manufacturing firms in Nigeria. The correlation coefficient (Spearman's rho) is 0.526, indicating a moderate positive relationship. The p-value (Sig. 2-tailed) is 0.000, which is less than the conventional significance level of 0.05. This indicates that the correlation between product quality control and cost savings is statistically significant. Therefore, the alternate hypothesis was accepted that product quality control significantly influences cost savings among small scale manufacturing firms in Nigeria (p-value = 0.000).

4.4 Discussion of Findings

The findings of the study on the implications of learning curve theory for cost control in small scale manufacturing firms in Nigeria highlight the importance of various factors in achieving cost savings. Production team expertise was revealed to significantly contribute to cost savings among small scale manufacturing firms in Nigeria: This finding highlights the impact of production team expertise on cost savings. Manufacturing firms with highly skilled and well-trained production teams are better positioned to identify and implement process improvements that reduce costs. The study suggests that production teams play a vital role in optimizing production processes, minimizing wastage, and maximizing resource utilization. To enhance cost savings, manufacturing firms should focus on developing the expertise of their production teams through training programs, knowledge sharing, and creating an environment that encourages continuous improvement. This is in consonance with the result found by Aduba (2021).

Finally, product quality control significantly enhances cost savings among small scale manufacturing firms in Nigeria: The study emphasizes the relationship between product quality control and cost savings. Effective product quality control measures have a direct impact on cost reduction. By ensuring high product quality, manufacturing firms can minimize rework, scrap, and customer returns, which in turn leads to significant cost savings. The findings suggest that implementing rigorous quality control measures not only reduces the risk of producing defective products but also enhances customer satisfaction and loyalty, ultimately contributing to cost savings. This finding aligns with the study by Aduba (2021). The study's findings equally confirms the postulations of experience curve theory which suggests that as individuals or organizations gain experience in a task or activity, they become more efficient

and productive (Boone et al., 2021), resulting in reduced costs and time required to complete each subsequent task (Abam & Nsien, 2022).

5.0 CONCLUSION AND RECOMMENDATIONS

This study aimed to investigate the implications of learning curve theory for cost control in small scale manufacturing firms in Nigeria. The specific objectives focused on examining the role of production team expertise, and product quality control in achieving cost savings. The study revealed that production team expertise significantly contributes to cost savings in the small scale manufacturing firms in Nigeria. Highly skilled and well-trained production teams were recognized as being better positioned to achieve cost savings. Finally, the findings emphasized the significant influence of product quality control on cost savings in the selected manufacturing firms. Effective product quality control measures were recognized as contributing to cost savings by minimizing rework, scrap, and customer returns. In conclusion, developing production team expertise, and focusing on product quality control enable firms to enhance their cost control efforts and improve their competitiveness and profitability.

Based on the findings, here are recommendations from each of the findings:

1. Firms should invest in training and development programs to enhance the expertise and skills of production teams in manufacturing firms in Nigeria as well as provide opportunities for team members to learn about process optimization, waste reduction, and resource utilization.

2. Manufacturing firms should strengthen product quality control measures in manufacturing firms in Nigeria by implementing rigorous quality control processes, conducting regular inspections, and addressing any identified issues promptly.

References

Abam, A. O., & Nsien, E. F. (2022). On the performance of Nigerian security agencies: a learning rate and learning curve perspective. *International Journal of Mathematical Analysis and Modelling*. https://tnsmb.org/journal2/uploads/volume%205/IJMAM_Vol5_Issue1_2022.pdf#page=93

Adegbie, F. F. & Fadere, T. V. (2020). Cost Management and Financial Performance of Consumer Goods Companies, Quoted in Nigeria. *International Journal of Scientific and Research Publications, 10*(8), 82-90.

Adigbole, E. & Osemene, O. (2019). Strategic Cost Management and Accuracy of Cost Information in Selected Manufacturing Firms in Lagos and Ogun States, Nigeria. *International Journal of Accounting & Finance (IJAF) 8*(1), 1-30.

Aduba, J. J. (2021). Analysis of technological learning and the learning curve of financial institutions in Nigeria (Doctoral dissertation). Graduate School of Economics, Ritsumeikan University. Available from file:///C:/Users/Praf's%20Touch/Downloads/k_1462.pdf

Aduba, J. J. (2021). Analysis of Technological Learning and the Learning Curve of Financial Institutions in Nigeria. https://ritsumei.repo.nii.ac.jp/?action=repository_action_common_download&item_id=14793&item_no=1&attribute_id=20&file_no=3

Aggreh, M., Abiahu, M. C. & Nworie, G. O. (2023). Cost Reduction and Financial Performance of Listed Consumer Goods Firms in Nigeria. *Journal of Banking, 11*(1), 1-38. https://www.researchgate.net/publication/376956491

Anderson, H. E., Santos, I. C., Hildenbrand, Z. L., & Schug, K. A. (2019). A review of the analytical methods used for beer ingredient and finished product analysis and quality control. *Analytica Chimica Acta, 1085*, 1-20.

Boone, E. R., Elshaw, J. J., Koschnick, C. M., Ritschel, J. D., & Badiru, A. B. (2021). A Learning curve model accounting for the flattening effect in production cycles. *Defense Acquisition Research Journal*.

Ezeagba (2014). Issues and Materials on Managerial Cost Accounting. Awka: RexCharles.

Hogan, D., Elshaw, J., Koschnick, C., Ritschel, J., Badiru, A. B., & Valentine, S. (2022). Cost estimating using a new learning curve theory for non-constant production rates. In *Handbook of Scholarly Publications from the Air Force Institute of Technology (AFIT), Volume 1, 2000-2020* (pp. 137-170). CRC Press.

Idigo, P. I. (2023). Intellectual Capital and Organizational Productivity in Manufacturing Firms in Anambra State, Nigeria. https://seahipaj.org/journals-ci/mar-2023/IJBLR/full/IJBLR-M-1-2023.pdf

Kanthana, D. (2018). The Effects of Cost Management Quality on the Effectiveness of Internal Control and Reliable Decision-Making: Evidence from Thai Industrial Firms. *Advances in Social Science, Education and Humanities Research, 211*(1), 60-69.

Kinyugo, J. M. (2014). The effect of cost efficiency on financial performance of companies listed on Nairobi securities exchange. An Unpublished Research Project Submitted to University of Nairobi.

Kuo, Y. (2006). Optimal adaptive control policy for joint machine maintenance and product quality control. *European Journal of Operational Research*, *171*(2), 586-597.

Lawal, B.A. (2017). Effect of Cost Control and Cost Reduction Techniques in Organizational Performance. *International Business and Management*, 14(3), 19–26.

Mitra, A. (2016). *Fundamentals of quality control and improvement*. John Wiley & Sons.

Mohr, F., & van Rijn, J. N. (2022). Learning Curves for Decision Making in Supervised Machine Learning--A Survey. *arXiv preprint arXiv:2201.12150*.

Nworie, G. O., & Nwoye, U. J. (2023). Drivers of Operating Profit: A Focus on Selected Firms' Costs. *CECCAR Business Review*, *4*(2), 62-72. dx.doi.org/10.37945/cbr.2023.02.07

Odieli, J. I., & Agari, E. P. (2023). Effect of Socio-Norms and Entrepreneurial Intention in Manufacturing Firms in Anambra State. https://seahipaj.org/journals-ci/mar-2023/IJBLR/full/IJBLR-M-13-2023.pdf

Oyedokun, G. E., Tomomewo, A. O. & Owolabi, S. A. (2019). Cost Control and Profitability of Selected Manufacturing Companies in Nigeria. *Journal of Accounting and Strategic Finance, 2*(1), 14-33.

Perrot, N., Ioannou, I., Allais, I., Curt, C., Hossenlopp, J., & Trystram, G. (2006). Fuzzy concepts applied to food product quality control: A review. *Fuzzy sets and systems*, *157*(9), 1145-1154.

Ross, P. (2011). Is there an expertise of production? The case of new media producers. *New media & society*, *13*(6), 912-928.

Steven, G. (2010). The learning curve. The key to future management?. *Chartered Institute of Management Accountants (CIMA)*, *6*(12), 1-7.

Teodoridis, F. (2018). Understanding team knowledge production: The interrelated roles of technology and expertise. *Management Science*, *64*(8), 3625-3648.

Ugulu, R. A., & Allen, S. (2018). Using the learning curve theory in the investigation of on-site craft gangs' blockwork construction productivity. *Built Environment Project and Asset Management*, *8*(3), 267-280.

Ukpai, N. A., & Akenbor, C. O. (2007). *Application of the learning curve theory in the construction industry in Nigeria*. Retrieved from https://www.researchgate.net/profile/Cletus-Akenbor-2/publication/275658412_APPLICATION_OF_THE_LEARNING_CURVE_THEORY_IN_THE_CONSTRUCTION_INDUSTRY_IN_NIGERIA/links/5543dd3d0cf234bdb21bd916/APPLICATION-OF-THE-LEARNING-CURVE-THEORY-IN-THE-CONSTRUCTION-INDUSTRY-IN-NIGERIA.pdf