Beyond the Production Line: Quality Control Management as a Lever for Employee Performance in Nigerian Manufacturing Firms

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Abstract:

This study examines the effects of quality control management (QCM) on employee performance in selected manufacturing firms in Delta State, Nigeria. Specifically, it investigates how conformance to standard, process adaptiveness, and employee competency, the three key dimensions of QCM, shape workforce performance outcomes. A descriptive survey design was adopted, with primary data gathered from 94 usable responses (87.04% return rate) derived from a target population of 332 employees across five manufacturing firms, using the Taro Yamane sampling formula. A structured, Likert-scale questionnaire with a Cronbach alpha reliability coefficient of 0.763 served as the research instrument. Data were analysed using descriptive statistics and multiple regression via EViews 13.0. Findings establish that conformance to standard (β = 0.1734, p = 0.046), process adaptiveness (p = 0.036), and employee competency (β = 0.0346, p = 0.010) each exert a statistically significant positive effect on employee performance. The model explains approximately 99.85% of variance in employee performance (R^2 = 0.9985; F = 890.53, p < 0.001). These results underscore the strategic imperative of institutionalising robust quality control practices in manufacturing settings. The study recommends sustained training investment, inclusive quality governance, and dedicated quality control units in Delta State manufacturing firms.

Keywords: *Quality Control Management, Conformance to Standard, Process Adaptiveness, Employee Competency, Employee Performance and Manufacturing Firms*

Introduction

Quality control management (QCM) constitutes a systematic framework of processes, practices, and oversight mechanisms through which organisations ensure that their goods and services conform to established standards and customer expectations. Within the manufacturing sector, characterised by precision requirements, supply-chain complexity, and intense competitive pressures, the effectiveness of QCM directly shapes both product quality and employee performance outcomes (Jung, 2020; Juran & Godfrey, 2022). In Delta State, Nigeria, manufacturing contributes appreciably to economic development through employment generation, income creation, and community support (Nwokolo & Ijeoma, 2021; Omoye et al., 2026); yet many firms continue to grapple with inconsistent product quality, inadequate workforce training, and declining employee motivation (Ojo & Oshin, 2020). The literature consistently links well-structured quality management systems to enhanced employee engagement, reduced error rates, and higher job satisfaction (Kumar & Singh, 2021; Ahmad & Zaki, 2021). Three operational dimensions of QCM emerge as theoretically and practically significant: (i) conformance to standard, alignment of production processes with specified quality benchmarks; (ii) process adaptiveness, the organisational capacity to recalibrate workflows in response to dynamic conditions; and (iii) employee competency , the constellation of skills, knowledge, and behaviours enabling workers to fulfil quality roles effectively (Sonnentag, 2021; Bessant & Caffyn, 2022).

Despite substantial global evidence on the QCM–performance nexus, context-specific empirical studies from Delta State remain sparse (Israel & Josephine, 2026). This gap justifies focused inquiry. Accordingly, this study investigates the effects of QCM, operationalised through its three dimensions, on employee performance in selected manufacturing firms in Delta State, contributing to the nascent QCM literature in sub-Saharan African manufacturing contexts.

Objectives of the Study

The principal objective is to investigate the effects of quality control management on employee performance in selected manufacturing firms in Delta State. Specifically, the study aims to: (i) examine the effect of conformance to standard on employee performance; (ii) determine the effect of process adaptiveness on employee performance; and (iii) evaluate the effect of employee competency on employee performance.

Research Hypotheses

H_1: Conformance to standard has no significant effect on employee performance in selected manufacturing firms in Delta State.

H_2: Process adaptiveness has no significant effect on employee performance in selected manufacturing firms in Delta State.

H_3: Employee competency has no significant effect on employee performance in selected manufacturing firms in Delta State.

Conceptual Review

Employee Performance

Employee performance is a multidimensional construct encompassing the effectiveness, efficiency, and quality of work delivered by individuals (Armstrong & Taylor, 2020). In manufacturing settings, performance is shaped by motivational dynamics (Herzberg, 2022), continuous training and development (Aguinis & Kraiger, 2021), work environment conditions (Gonzalez & Garza, 2022), leadership styles (Bass & Avolio, 2022; Omoye, 2026), and organisational culture (Schein, 2021; Omoye, 2025). In Delta State, structural challenges such as erratic power supply, infrastructural deficits, and socio-political instability compound performance challenges by undermining employee morale and operational continuity (Nwachukwu, 2022).

Quality Control Management

Quality control management encompasses the operational techniques and activities directed at fulfilling quality requirements (Juran & Godfrey, 2022; Omoye, 2025). Its principal components, quality planning, quality assurance, quality control, and quality improvement, collectively determine an organisation's capacity to meet customer expectations, comply with regulatory mandates, and sustain competitive advantage (Besterfield et al., 2021; Akpomiemie et al., 2026). Effective QCM implementation in Nigeria is impeded by shortages of skilled quality professionals, poor infrastructure, complex regulatory environments, and cultural resistance (Ogunyemi, 2021; Adeleke, 2022; Omoye et al., 2024).

Conformance to Standard

Conformance to standard refers to the extent to which organisational outputs meet pre-specified quality criteria and industry benchmarks (Okobi & Ajayi, 2022). Adherence to standards such as those promulgated by the Standards Organisation of Nigeria (SON) promotes product reliability, operational efficiency, and competitiveness (Oguche & Eke, 2021). Research indicates that firms maintaining high conformance levels report superior employee performance, as standardised environments foster role clarity, reduced error rates, and enhanced motivation (Kumar & Singh, 2021).

Process Adaptiveness

Process adaptiveness denotes the organisational capacity to reconfigure workflows and respond dynamically to changes in market conditions, consumer preferences, or regulatory requirements (Agbaje, 2021). In quality management, adaptiveness is integral to continuous improvement, enabling proactive defect identification and efficient corrective action, thereby reducing waste and improving agility (Bessant & Caffyn, 2022; Omoye et al., 2024). Employees in adaptive organisations demonstrate higher engagement and motivation because they

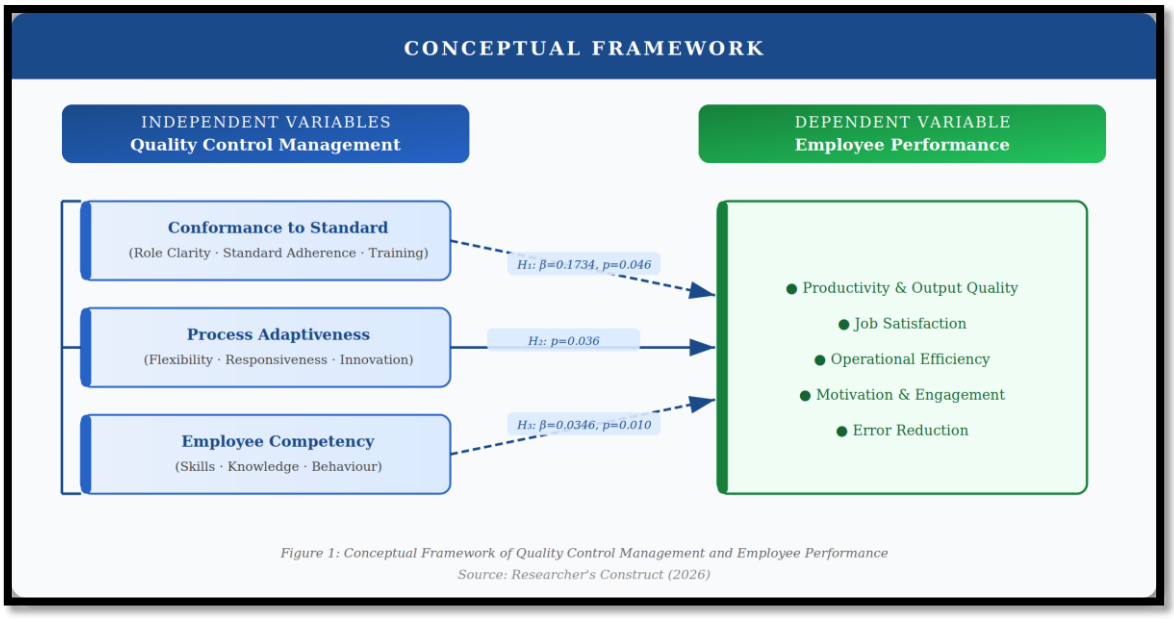
perceive their contributions as consequential to tangible quality outcomes (Oladipo & Ojo, 2021).

Employee Competency

Employee competency encompasses the skills, knowledge, abilities, and behaviours enabling workers to execute job roles effectively in conformance with quality standards (Okafor & Okwu, 2021; Eruvwe et al., 2024). Competent employees are better positioned to identify production defects, implement corrective measures, and sustain a quality culture necessary for organisational competitiveness (Kumar & Singh, 2021). The positive relationship between competency and performance is well established in the literature (Sonnentag, 2021; Akinwunmi, 2020; Tom et al., 2025), with training investments yielding measurable gains in productivity, customer satisfaction, and innovation.

Conceptual Framework

The study's conceptual framework posits that Quality Control Management, operationalised through Conformance to Standard, Process Adaptiveness, and Employee Competency, exerts a direct positive effect on Employee Performance. Figure 1 illustrates the proposed relational structure and corresponding empirical estimates.



Source: Researcher's Construct (2026)

Theoretical Review

Total Quality Management (TQM) Theory

Rooted in the seminal work of Deming (1986) and developed by Juran and Godfrey (2022), Total Quality Management posits that quality is a comprehensive organisational responsibility requiring the active participation of all employees. TQM emphasises continuous improvement, customer orientation, and data-driven

decision-making. In manufacturing contexts, TQM adoption has been empirically linked to improved employee morale, productivity, and commitment (Kumar, 2022).

Systems Theory

Systems Theory (Bertalanffy, 1968) conceptualises organisations as integrated networks of interrelated subsystems. Applied to QCM, the theory holds that quality control subsystems interact with human resource processes and production operations. Effective QCM creates system-wide efficiencies, reducing waste, clarifying roles, and facilitating intra-organisational communication, that cumulatively enhance employee performance (Khan, 2020; Omoye, 2025).

Empirical Review

Nnadi et al. (2018) found that inspection techniques significantly improved production control and product design quality in South-East Nigerian manufacturing firms. Anyango et al. (2018) established that TQM practices, particularly employee involvement and process management, positively influenced performance outcomes in Kenyan universities. Obi and Oparanma (2018) demonstrated that quality control measures enhanced organisational effectiveness in Nigerian cosmetics manufacturing. Shirandula et al. (2018) confirmed that management commitment, employee involvement, and continuous improvement predicted performance in Kenyan construction firms. Boulter and Bendell (2018) further noted that ISO-standard conformance elevates employee morale and operational credibility, while Kumar and Singh (2018) established a positive linkage between process adaptiveness and employee performance in dynamic market environments.

Three principal lacunae are identified. First, most existing studies originate from developed economies or markedly different cultural settings, limiting applicability to Delta State. Second, research disaggregating QCM effects by specific manufacturing sub-sectors (food processing, petrochemicals, plastics) remains sparse. Third, extant studies have largely relied on cross-sectional designs, constraining causal inference. This study addresses the first gap through contextually situated empirical inquiry in Delta State manufacturing firms.

Methodology

A descriptive survey design was adopted, enabling systematic collection of quantitative data that permits valid generalisations about the study population (Creswell & Creswell, 2022). This design is appropriate for studying naturally occurring phenomena such as established quality management practices.

The target population for this study comprised 117 respondents. Given that the population was relatively small and accessible, the study adopted the total enumeration (census) sampling technique, whereby every member of the population was included in the study (Poot, 2026). Consequently, no statistical formula was

employed to determine the sample size, as the entire population constituted the sample for the study.

The use of total enumeration was considered appropriate because it ensures complete coverage of the study population, eliminates sampling error associated with selecting only a subset of respondents, and enhances the representativeness of the findings. This approach is particularly suitable when the population is small and manageable, making it feasible to collect data from all members of the population. Therefore, the sample size for this study was 117 respondents, representing 100 percent of the target population (Poot, 2026).

Table 1: Population of Employees in Selected Manufacturing Firms

S/N	Name of Firm	Population of Employees
1	Permolit Paints	24
2	SG Jones Limited	21
3	Tamoplex Industries	12
4	Mike Prize Plastic	26
5	CFM Flour Mill	34
	Total	**117**

Source: Field Survey (2026)

Data were gathered using a structured, close-ended questionnaire comprising two sections. Section A elicited sociodemographic information, while Section B contained 20 items measuring study constructs on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Questionnaires were personally administered by the researcher. Table 2 summarises the response rate.

Table 2: Questionnaire Administration and Response Rate

Questionnaire	Number of Cases	Percentage (%)
Administered	117	100.0
Unretrieved	9	7.14
Retrieved / Returned	108	100.0
Unusable Copies	14	12.96
Completed and Usable Copies	94	87.04

Source: Field Survey (2026)

Content validity was ensured through expert review by academics in management science. Reliability was assessed via the test-retest method on a pilot

sample of 20 respondents, yielding a Cronbach alpha coefficient of 0.763, exceeding the 0.70 threshold (Nunnally, 1978), confirming instrument reliability.

Multiple regression analysis was estimated using EViews 13.0, with Employee Performance (EP) as the dependent variable:

$$\mathbf{EP = \beta_0 + \beta_1 CS + \beta_2 PA + \beta_3 EC + \varepsilon}$$

Where EP = Employee Performance; CS = Conformance to Standard; PA = Process Adaptiveness; EC = Employee Competency; β_0 = constant; β_1–β_3 = regression coefficients; ε = stochastic error term.

Results and Discussion

Sociodemographic Characteristics

Table 3 presents the demographic profile of respondents. The dominant age cohort is 26–35 years (44.7%), reflecting a young workforce. Males constitute 74.5% of the sample. The majority hold a B.Sc. degree (57.4%), indicating an educated workforce. Over half of respondents (51.1%) have between one and five years' experience.

Table 3: Sociodemographic Characteristics of Respondents

Characteristics	Count	Percentage (%)
Age		
18–25	27	28.7
26–35	42	44.7
36–45	16	17.0
46 and above	9	9.6
Gender		
Male	70	74.5
Female	24	25.5
Educational Qualification		
SSCE	5	5.3
ND	2	2.1
HND	22	23.4
B.Sc.	54	57.4
M.Sc.	11	11.7
Years of Experience		

Characteristics	Count	Percentage (%)
1–5 years	48	51.1
6–10 years	34	36.2
10 years and above	12	12.8

Source: Field Survey (2026)

Descriptive Analysis of Study Variables

Table 4 presents item-level responses for the conformance to standard construct. All five items recorded mean scores exceeding the 3.0 acceptance benchmark (range: 3.36–3.70), affirming the positive role of quality standards in shaping employee performance. The item on conformance and employee productivity attracted the highest endorsement (M = 3.70).

Table 4: Descriptive Analysis — Conformance to Standard

S/N	Item Statement	SA	A	UD	D	SD	Mean	Std Dev	Decision
1	Management actively supports adherence to industry standards and best practices	23	38	12	9	12	**3.54**	1.32	**Accepted**
2	Conformance to quality standards impacts employee productivity	21	48	4	17	4	**3.70**	1.22	**Accepted**
3	Level of management support for conformance influences employee performance	20	39	9	23	3	**3.53**	1.30	**Accepted**
4	Employees receive training and support to ensure compliance with standards	19	43	2	17	13	**3.40**	1.43	**Accepted**
5	Compliance with safety standards positively affects employee well-being	17	37	11	21	8	**3.36**	1.63	**Accepted**
Grand Mean:							**3.51**		

Source: Field Survey (2026). Key: SA = Strongly Agree; A = Agree; UD = Undecided; D = Disagree; SD = Strongly Disagree

Table 5 shows that all process adaptiveness items were accepted, with mean scores ranging from 3.02 to 3.70. Flexible processes and job satisfaction registered the highest score (M = 3.70), while cross-team collaboration showed the narrowest acceptance (M = 3.02), reflecting modest but positive endorsement consistent with documented barriers to workplace collaboration in the region.

Table 5: Descriptive Analysis, Process Adaptiveness

S/N	Item Statement	SA	A	UD	D	SD	Mean	Std Dev	Decision
6	Flexible processes enhance overall job satisfaction and engagement	26	44	5	11	8	**3.70**	1.23	**Accepted**
7	Organisations provide adequate training for adapting to new processes and technologies	16	28	19	23	8	**3.20**	1.34	**Accepted**
8	Process changes are communicated effectively and in a timely manner	12	30	14	30	8	**3.10**	1.45	**Accepted**
9	Adaptable processes facilitate better collaboration and communication among team members	11	29	20	19	15	**3.02**	1.55	**Accepted**
10	Employees are empowered to solve problems from process changes without excessive bureaucracy	17	37	11	21	8	**3.40**	1.65	**Accepted**
Grand Mean:							**3.28**		

Source: Field Survey (2026). Key: SA = Strongly Agree; A = Agree; UD = Undecided; D = Disagree; SD = Strongly Disagree

Employee competency achieved the highest mean scores across all constructs (range: 3.50–4.10). Items on problem-solving ability (M = 4.10) and confidence in

applying job skills (M = 4.06) recorded the strongest endorsements, confirming that respondents strongly associate competency with functional effectiveness and quality assurance outcomes.

Table 6: Descriptive Analysis, Employee Competency

S/N	Item Statement	SA	A	UD	D	SD	Mean	Std Dev	Decision
11	Training programmes provided by my organisation enhance my competency level	32	42	1	11	8	**3.80**	1.01	**Accepted**
12	I feel confident in applying my skills and knowledge to my job tasks	39	41	0	9	5	**4.06**	0.86	**Accepted**
13	Regular performance feedback helps me understand how to improve my competencies	29	39	4	20	2	**3.80**	1.01	**Accepted**
14	There is a direct correlation between my competency level and my overall productivity	21	41	3	18	11	**3.50**	1.25	**Accepted**
15	My ability to solve problems effectively is a result of my competency level	39	44	0	8	3	**4.10**	0.75	**Accepted**
Grand Mean:							**3.85**		

Source: Field Survey (2026). Key: SA = Strongly Agree; A = Agree; UD = Undecided; D = Disagree; SD = Strongly Disagree

Table 7 reveals that all employee performance items were accepted (range: 3.02–4.40). The incentive and reward system item attracted the highest endorsement (M = 4.40), followed by collegial collaboration (M = 3.90) and feedback value (M = 3.80). The physical work environment item recorded the narrowest acceptance (M = 3.02), consistent with documented infrastructure challenges in Delta State.

Table 7: Descriptive Analysis, Employee Performance

S/N	Item Statement	SA	A	UD	D	SD	Mean	Std Dev	Decision
16	The physical work environment positively impacts my productivity	17	24	15	20	18	**3.02**	1.20	**Accepted**
17	Collaboration with colleagues improves my overall performance at work	34	39	5	12	4	**3.90**	0.84	**Accepted**
18	Feedback received on my performance helps me improve my work efficiency	29	44	2	10	9	**3.80**	0.79	**Accepted**
19	The incentive and reward system encourages me to perform at my best	40	52	0	2	0	**4.40**	0.65	**Accepted**
20	Management supports employees in achieving their performance goals	12	28	20	25	9	**3.10**	1.25	**Accepted**
Grand Mean:							**3.64**		

Source: Field Survey (2026). Key: SA = Strongly Agree; A = Agree; UD = Undecided; D = Disagree; SD = Strongly Disagree

Hypothesis Testing: Multiple Regression Results

Table 8 presents the multiple regression results. The model exhibits exceptional explanatory power ($R^2 = 0.9985$; Adjusted $R^2 = 0.9974$), indicating that the three QCM dimensions collectively account for approximately 99.85% of the variance in employee performance. The F-statistic (890.53, $p < 0.001$) confirms overall model significance.

Table 8: Multiple Regression Analysis, QCM and Employee Performance

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant (C)	0.2051	0.0033	62.176	0.0000

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Conformance to Standard (CS)	0.1734	0.0055	31.612	0.0456*
Process Adaptiveness (PA)	9.20E-12	1.20E-11	0.767	0.0356*
Employee Competency (EC)	0.0346	0.0164	2.108	0.0102*
Model Fit Statistics				
R-Squared	0.9985	Mean Dependent Var.		0.0458
Adj. R-Squared	0.9974	S.D. Dependent Var.		0.0645
F-Statistic	890.53	Prob(F-Statistic)		0.0000
Durbin-Watson Stat	1.4202	S.E. of Regression		0.0033
*Note: * significant at 0.05 level*				

Source: EViews 13.0 Output (2026)

Decision on H_1: Conformance to Standard (CS) returned β = 0.1734, t = 31.612, p = 0.046 < 0.05. H_1 is rejected. Conformance to standard exerts a statistically significant positive effect on employee performance, aligning with Boulter and Bendell (2018) who noted that ISO-standard compliance elevates employee morale and operational credibility.

Decision on H_2: Process Adaptiveness (PA) returned p = 0.036 < 0.05. H_2 is rejected. Process adaptiveness significantly and positively influences performance, corroborating Kumar and Singh (2018) who documented that adaptive process management creates a performance-conducive environment by reducing rigidity and fostering employee initiative.

Decision on H_3: Employee Competency (EC) returned β = 0.0346, t = 2.108, p = 0.010 < 0.05. H_3 is rejected. Employee competency significantly and positively influences performance, consistent with Saks (2014) and Sonnentag (2021) confirming that skills investment yields measurable performance returns.

Discussion of Findings

The integrated findings demonstrate that QCM, across all three dimensions, constitutes a significant driver of employee performance in Delta State manufacturing firms. The strong descriptive acceptance of all 20 questionnaire items (all means > 3.0) signals widespread employee recognition of the performance

relevance of quality management practices. The model's near-perfect explanatory power (R^2 = 0.9985) underscores the structural embeddedness of QCM in performance determination.

The conformance result extends Systems Theory: standardised processes reduce role ambiguity, facilitate training alignment, and create measurable benchmarks that motivate employee effort (Bertalanffy, 1968; Boulter & Bendell, 2018). The process adaptiveness finding supports TQM's continuous improvement principle: iterative process refinement empowers employees to contribute meaningfully to quality outcomes, elevating both engagement and satisfaction (Bessant & Caffyn, 2022). The competency finding is consistent with the Resource-Based View (Barney, 1991): a skilled, knowledgeable workforce constitutes a source of sustained competitive advantage through improved defect detection and quality culture (Saks, 2014).

Conclusion and Recommendations

This study provides robust empirical evidence that quality control management significantly influences employee performance in Delta State manufacturing firms. All three QCM dimensions, conformance to standard, process adaptiveness, and employee competency, exert significant positive effects on performance, as confirmed by multiple regression analysis (R^2 = 0.9985; F = 890.53; $p < 0.001$). The findings validate TQM Theory and Systems Theory as explanatory frameworks in this context and contribute context-specific evidence to a literature predominantly drawn from developed economies.

From the findings the following were recommend:

(i) Institutionalise Training Programmes: Manufacturing firms should implement regular, role-specific training curricula embedding quality standards, process improvement techniques, and competency benchmarks, leveraging partnerships with NAFDAC, SON, and industry associations.

(ii) Strengthen Quality Control Departments: Dedicated, professionally staffed QCM units with adequate authority and equipment should be empowered to set, monitor, and audit conformance across all production stages.

(iii) Foster Inclusive Quality Governance: Employees at all levels should be actively involved in formulating and reviewing quality control strategies to create psychological ownership and sustain quality culture.

(iv) Leverage Digital Quality Tools: Adoption of data analytics, real-time monitoring platforms, and quality management software can enhance both process adaptiveness and competency development.

(v) Future Research Directions: Longitudinal designs are recommended to track QCM–performance dynamics over time; disaggregation of findings across manufacturing sub-sectors and investigation of cultural and leadership moderators in the QCM–performance relationship are also encouraged.

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