

Effect of Cultural Diversity on Efficiency of Pharmaceutical Manufacturing Firms in Cross Rivers State, Nigeria

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Abstract

This study examined the influence of cultural diversity on the operational efficiency of pharmaceutical companies in Cross River State, Nigeria. Specifically, it investigated whether effective communication contributes to minimizing resource wastage and whether teamwork awareness enhances product quality. The study focused on five pharmaceutical firms selected based on workforce size and years of establishment. A total population of 303 employees was surveyed, and due to the manageable size, a census approach was adopted. Data were collected using structured questionnaires and interviews, with 253 properly completed questionnaires returned. The data were analyzed using mean scores and Z-tests in SPSS. Findings revealed that effective communication significantly reduces resource wastage ($Z = 8.400, p < 0.05$), and teamwork awareness significantly improves product quality ($Z = 10.483, p < 0.05$). The study concluded that both communication and teamwork positively influence waste reduction and product quality in pharmaceutical companies in Cross River State. It recommends that firms strengthen communication processes through clear information channels and regular feedback mechanisms across all organizational levels.

Keywords: Communication, cultural diversity, operational efficiency, teamwork, resource wastage, product quality, Cross River State, Nigeria.

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Introduction

The idea of cultural diversity has changed over time. In the past, manufacturing companies worked in fairly similar cultural places, with local workers, stable populations, and not much interaction between cultures in many factories. As the world became more connected in the late 20th century, companies started to hire and manage more varied workforces, with people from different ethnic, language, regional, national, and cultural backgrounds. This change created both chances and problems for how well manufacturing worked. For instance, researchers who study flexibility in future manufacturing systems think that coordination and cultural diversity help make manufacturing systems efficient and flexible (Lee, et al., 2022). Cultural diversity means that there are differences in ethnicity, language, religion, values, and social habits among people in a company or society. It includes the different cultural backgrounds that workers bring to their jobs, which can change how they act, talk to each other, and perform (Nwigwe et al., 2024; Lee et al., 2022). When handled well, cultural diversity can boost creativity, innovation, and how well things are done. But if it's not handled correctly, it can cause arguments and lower productivity (Waktol, 2023). Around the world, there's early proof that cultural diversity is related to productivity and innovation. The Organisation for Economic Co-operation and Development (OECD) says that manufacturing companies with 5-10% of managers from a foreign cultural background were about 11% more productive than companies with almost none.

In Nigeria, the workforce is naturally diverse in terms of ethnicity, language, religion, and cultural habits. Studies of how well companies perform in Nigeria show that cultural diversity (ethnic, religious, linguistic) affects how well a company works and how committed its employees are. A study in 2023 found that ethnic diversity had a big impact on how well Nigerian Breweries Plc. worked (Nwigwe, 2024). Another study showed that communication between cultures and managing diversity well helped multinational companies in Nigeria gain a competitive edge.

In Cross River State, the business of making medicine is starting to grow. The state government has put money into a medicine factory that's meant to meet international rules (like those from the World Health Organization) and serve both local and regional markets (Tribune Online). Because the area is ethnically and culturally diverse (and the workforce might come from different states, languages, and backgrounds), it's important to know how cultural diversity affects how well things work. Despite the possibility, there's not much research that looks specifically at medicine-making companies in Cross River State (or similar places in Nigeria) to see how cultural diversity (in terms of ethnicity, language, religion, regional origin) affects things like how well processes work, how well best practices are used, how well quality rules are followed, how productive workers are, and how well lean manufacturing works.

In medicine companies, efficiency means using resources like materials, labor, technology, and time in the best way to make high-quality drugs at the lowest cost, while still following rules and keeping products safe. It involves making production processes smoother, reducing waste, and improving productivity to be more competitive and make more money (Waktol, 2023; Nigwe et al., 2024). Efficient medicine operations make sure drugs are delivered on time, costs are controlled, and the industry can grow in a lasting way. Because of all this, this study wants to look at how cultural diversity affects how well medicine-making companies in Cross River State work.

Problem Statement

Ideally, medicine-making companies should work in ways that make them as efficient, productive, and quality-focused as possible. In these situations, cultural diversity in the workforce should be a good thing, bringing together different ideas, new thoughts, and skills that help solve problems and make processes better. When managed well, a culturally diverse workforce can encourage creativity, adaptability, and teamwork, which are key for keeping up with international production rules, making sure rules are followed, and being competitive in the medicine business. In developed countries and well-run companies, diversity management policies and inclusive company cultures have been shown to improve how involved employees are and how well things work overall.

But in reality, many medicine-making companies in Nigeria, especially in Cross River State, struggle to use the benefits of cultural diversity. These companies often work in places with different ethnic groups, languages, and religions, but they don't have clear strategies for managing diversity. Poor communication between cultures, ethnic bias, misunderstanding of work values, and ineffective teamwork are common problems that make it hard to coordinate and make processes efficient. Also, managers often don't know how to handle multicultural workforces, which has led to tension, disagreements about roles, and low morale among workers. This affects how well things work, like productivity, quality, and following manufacturing rules. Even though these problems exist, there's not much research that looks at how cultural diversity affects how well medicine-making companies work in Cross River State, an area with a very diverse population and a growing medicine industry.

If this problem isn't fixed, there could be big results. Not managing cultural diversity well could lead to ongoing problems with efficiency, low motivation among employees, and higher production costs, which could hurt how competitive medicine-making companies in the state are. More importantly, if medicine production isn't efficient, it can hurt product quality and how reliably drugs are supplied, which could be bad for public health and the economy. Also, companies that don't recognize and use cultural diversity risk losing their ability to come up with new ideas and keep their workforce united, which makes it hard to meet local and international rules and market needs. So, understanding and managing how cultural diversity affects efficiency is not just a smart move, but also important for the long-term survival and growth of medicine-making companies in Cross River State.

Objectives of the Study

The main objective of the study was to Effect of cultural diversity on efficiency of Pharmaceutical manufacturing firms in Cross Rivers State. The specific objectives were to:

- i. Determine the effect of communication effectiveness on Minimizing resource wastage of Pharmaceutical manufacturing firms in Cross Rivers State
- ii. Ascertain the impact of team collaboration awareness on high-quality products of Pharmaceutical manufacturing firms in Cross Rivers State.

Research Questions

The following Research Questions guided the study

- i. What is the effect of communication effectiveness on Minimizing resource wastage of Pharmaceutical manufacturing firms in Cross Rivers State?
- ii. What is the impact of team collaboration awareness on high-quality products of Pharmaceutical manufacturing firms in Cross Rivers State?

Statement of the Hypotheses

- i. Communication effectiveness has significant effect on Minimizing resource wastage of Pharmaceutical manufacturing firms in Cross Rivers State
- ii. Team collaboration awareness has significant effect on high-quality products of Pharmaceutical manufacturing firms in Cross Rivers State.

Review of Related Literature

Conceptual review

Culture

In Nigerian pharmaceutical manufacturing, culture reflects the shared values, beliefs, norms, practices, and behaviors within a group or company. It shapes how people understand situations, interact, make choices, and conduct work. This embraces both the national culture – broad values and traditions – and the particular organizational culture, including company philosophies, work habits, and ways of doing things that set apart one pharmaceutical firm from another. As noted by Adeyemi and Ogunlade (2022), culture within this sector creates a base that affects how employees feel, relationships between groups, how well rules are followed, and the overall success of a company in Nigeria's complicated and diverse society.

The culture in Nigeria's pharmaceutical manufacturing industry is very important because the country has many different ethnic groups, languages, and religions. This mix changes how people work together, how they talk to each other, and how they team up. This sector has over 250 ethnic groups, including Hausa-Fulani, Yoruba, and Igbo. Each group has distinct views on who is in charge, how to manage time, how to resolve disagreements, and how to interact with others (Okonkwo et al., 2023).

Diversity

In Nigerian pharmaceutical manufacturing, diversity means having a mix of human features, backgrounds, views, and experiences in the workforce. This includes things we can see, like ethnicity, gender, age, and ability, and things we can't easily see, like education, values, thinking styles, and past work. This variety in workers brings different perspectives, skills, and methods to fix problems, come up with new ideas, and do the work. Oladipo and Fashola (2021) suggest that diversity in this field is useful and when handled well, it grows creativity, better decision-making, quicker responses to the market, and greater ability to change in a world that is getting more complex and linked.

In the pharmaceutical sector in Nigeria, we see diversity mainly in the form of many ethnic groups. The workforce usually has individuals from Hausa, Yoruba, Igbo, Ijaw, Kanuri, Tiv, plus many other groups. Each one adds their own culture, way of talking, and approach to work (Adebayo and Ogunleye, 2023).

Cultural Diversity

Cultural diversity in Nigerian pharmaceutical firms relates to how different cultures, traditions, beliefs, and behaviors exist together within the company. These variations in what people are used to based on their ethnicity, religion, language, region, and values shape their work, view on authority, relationships, and company goals. Regular diversity is about all kinds of human differences, but cultural diversity focuses on how culture deeply impacts actions at work, communication, how arguments are handled, and teamwork. According to Chukwu and Nnaji (2023), cultural diversity here is both helpful and hard to deal with. Companies should use the mix of cultures to create new things and reach goals but should also take steps to avoid problems like misunderstandings, disagreements, and trouble coordinating, which all come from cultural differences.

Components of Cultural Diversity that Formed Part of the Objective of the Study

Communication

In Nigerian pharmaceutical manufacturing, communication means how well information, instructions, feedback, and know-how are sent, received, understood, and followed correctly and quickly by different individuals, teams, and sections. Good communication helps things get done in sync, helps people make informed choices, promotes work excellence. It involves clear messages, suitable ways to share information, correct info, understanding by those who get it, ways to check that people understand, and actions that match what was said. Olabode and Adewumi (2023) explain that proper communication here is key for making sure things are right, keeping things safe, following the rules, working together on new ideas, and making the place more productive. It can be tough but required when you have diverse cultures because language problems, different communication styles, and different cultural views can get in the way of information moving and people understanding each other.

In Nigeria's pharmaceutical production, communication is affected by cultural range including language, ethnic ways of talking, expectations based on rank, and communication that depends on setting. Varying languages cause problems, because employees might have different English skills, use different native languages, and understand pharmaceutical terms differently depending on their education and languages (Akinola & Fashola, 2022).

Team Collaboration

In Nigerian pharmaceutical manufacturing, team collaboration means how well team members know, accept, and value what it takes to work together. This includes understanding what each person relies on others for, what everyone is responsible for, team aims, and actions that support teamwork. This is especially true in teams with different cultures, where different work habits, ways of communicating, values, and what people expect have to fit together. It includes knowing targets and standards, understanding jobs and connections within teams, acknowledging how culture affects team actions, valuing different ideas, and acting in ways that help cooperation like sharing information, helping each other, giving feedback, and solving problems together, all of which help the team succeed. Mohammed and Yusuf (2023), team collaboration is the basis for cooperative action. It is really important in pharmaceutical teams where culture impacts team work, how disagreements get solved, and what is expected of leaders. When people are aware and adjust for culture, it helps overcome barriers to teamwork.

Team collaboration is key in Nigeria's pharmaceutical manufacturing because making drugs, checking quality, and getting better all depend on different experts working together. Workers, quality checkers, technicians, pharmacists, engineers, and managers must act in sync to ensure product quality, safety, and compliance (Okeke et al., 2023).

Efficiency

Within Nigerian pharmaceutical manufacturing, efficiency is about making the best usage of what a company possesses such as materials, equipment, time, electricity, and employees. The goal is to produce what is desired, meet quality standards, and reach company targets while avoiding waste, extra steps, and unnecessary spending. This maximizes output and saves money while keeping drug quality, safety, and regulatory compliance intact. Efficiency covers things from how well outputs relate to inputs in making products, to how well resources are mixed and used in order to achieve important targets. Eze and Okoro (2023) say that, in making drugs, efficiency has many sides. It includes using resources well, making activities better, cutting down on waste, good time use, and managing costs. Together these things decide how competitive a company is, how profitable it is, and how well it lasts in the difficult Nigerian market. Efficiency is very important for Nigeria's pharmaceutical manufacturing because of competition in the country and overseas, pressure to keep costs down because of cheap, imported drugs, difficult infrastructure that increase costs, rules that require quality investment, and money issues that affect prices and demand (Hassan & Bello, 2023).

High-Quality Products

In Nigerian pharmaceutical manufacturing, high-quality products are drugs that consistently meet or exceed quality standards, rules, and what customers expect in terms of identity, purity, strength, safety, how well they work, stability, and reliability. High-quality ensures drugs will be effective, safe for individuals, and comply with rules. Also, they build brand confidence, consumer trust, and market competitiveness. This means following Good Manufacturing Practices (GMP), sticking to official standards, achieving the right chemical and physical features, avoiding contamination, using appropriate packaging that keeps the drug safe, and confirming consistent quality from batch to batch. Oladipo and Fashola (2023) states that high-quality items are the basis in pharmaceutical, they determine how patients will fare, whether regulators will approve sales, acceptance in the market, brand value, and the company's ability to last. Excellence in quality must be the aim when making drugs, no matter pressures or money issues. However, making high-quality items in Nigeria's pharmaceutical sector faces problems including raw materials that change based on the supplier, old equipment, weak testing labs, not enough skilled workers, poor environmental control, and regulatory problems that cause substandard goods to exist (Lawal & Adekunle, 2023).

Empirical Review

Communication on minimizing resource wastage

Kiambuthi (2023) researched how communication affects service at Presbyterian University of East Africa, Kikuyu Campus. It used a descriptive design. Both types of info helped decide sample size. Questionnaires were given randomly to get responses. The study showed that 158 people said that school leaders should motivate workers and that better communication is required for moving information. Also, 43.9% say there is two-way sharing in the school. Over 48% felt they did not get enough information from leaders, departments, or staff. The study shows that almost everyone interviewed felt that communication is everything for service, accounting for 307.32 out of 360 degrees. So, communication is vital for service at Presbyterian University of East Africa.

Olugbo, et al., (2023) checked how effective communication affects school success at Bayelsa Medical University, Yenagoa. Questionnaires went to leaders, deans, directors, department heads, teachers, and senior staff. ANOVA and factor study looked at links between things at a 5% level. A total of 180 people (25 teachers and 155 other workers) from fourteen departments/units took part. The study learned good talking created better worker results. Four things (Communication Process ($t = 4.003$, $\beta = 1.786$, $p = 0.00$); Climate ($t = 3.316$, $\beta = 1.483$, $p = .001$); Clues ($t = 1.990$, $\beta = .832$, $p = .047$); and Ways of Talking ($t = 5.092$, $\beta = 1.808$, $p = .000$)) helped workers to communication well in a school. Also, good communication made for a successful organization.

Wachira *et al.* (2023) examined how communication influences service delivery in water companies in the Mount Kenya Region. The study focused on both the companies and their personnel. A sample of 384 respondents was drawn from 28 water companies, and data were collected using structured questionnaires. The results were analyzed using descriptive tables and charts. Findings revealed a strong positive relationship between communication strategy and service delivery ($r = 0.820$). Communication strategy significantly ($p < 0.001$) explained variations in service delivery, with a regression coefficient of 0.774. The study concluded that communication has a significant effect on service delivery in water companies in the Mount Kenya Region and recommended that water company boards ensure managers are equipped with effective communication strategies.

Adewale (2024) investigated the effect of communication on civil service performance in Benue and Kwara States. The study was anchored on communication theory and utilized a survey research design with stratified sampling. From a population of 1,439 civil servants, a sample of 313 respondents was selected. The findings indicated that communication strategy had a significant influence on service delivery, $F(1, 304) = 81.320, p < 0.05$. The study concluded that communication substantially enhances service delivery in both states and recommended that state governments strengthen communication structures to improve civil service performance.

Wekesa et al. (2025) researched how communication affects service quality inside the Ministry of Interior and National Administration, Kenya. Secondary info and qualitative ways were used. Research articles, rules, and examples helped look at existing research determine the current state of communication. The research displayed the significance of internal talking to the development of serving the people. Expressing down helped say the rules and goals well, up helping send good info from little guys up. Side talking helps trade ideas and cohesion throughout service. Stakeholder involvement helped communication through folk. Offering info also improved services, taking away slowdowns. Applying means to talk can control desires in people, hand info early, and fix group sync, developing successful services.

Team collaboration on high-quality products

Khadija (2024) examined how workplace culture affects how well places of work do, looking at the good and bad of different work forces; the research goes into; how diversity related to race or cultural background help to increase creativity, and affects organizational growth and value or profit. Also, seeing how theoretical structures influence the relationship between diversity and performance the findings means diversity can grow great results such as miscommunication. The study tells of practical meanings for organizations looking to make diversity to better perform.

Nduhura et al. (2024) examined how team work impacts worker action with small business people in Kampala. The study uses a research tactic to inspect a limited answer. A select design was chosen to select a sample sizing of 50 individuals. Secondary data was collected the study showed the worker greatness/ worth grow when good connection is made between people / community inside of an establishment / establishment. It means that if workers connect well it shows that they can take what the industry passes out to make the greatest worth/ profit from the worker. Based on what was made available there is great worth in talking it up and how worth something is. Good talking to has all tactics that the community has played out which is to extract all worker help also assist and aid in goal being seen to full sight. Point degree of worth tells good with action as things are made known.

Eyiah et al. (2025) inspected management, differences, and effect on project success. It was guided in a good way at an global establishment getting people getting involved from Europe, Asia, America, and Africa. Getting to know info tells key unit and class off what is real on a thing that done been shown from action. Good work area helps create chances by good action, good solving also good household type traits. Showing keys helps connecting strongly removing communication walls also different views taking in what said what has been made protected as project made on. Strong establishment that are building puts team together by great action and also good people selecting putting all level in working level area. Project managers have ability grows group and well does by great people skill and language so group is build by good goal.

Khassawneh and Mohammad (2025) did checks in how work force diversity on how it does by seeing how useful it can be in places that offer care in hospitality sectors. Seeing that training what is done is being shown to strengthen things. So, gathering the info from leaders' managers and others inside 167. These tests shown that there great worth of diversity and training makes things strong.

Gap in Review

After seeing past papers the study watched that nothing wasn't done in state in Nigeria but state where this study is based and how that makes a difference to the end, and the past papers checks would be use by person action coefficient. This means study how effect culture changes how well industry how the point will stand out.

Methodology

The study was based on the three (3) selected pharmaceutical firms with high number of staff and long years of establishment.. The total population for the study was three hundred and three (303). The study made use of the whole due to its small number. A survey design was adopted for the study. Instrument used for data collection was the questionnaire and interviews. Two hundred and fifty three (253) copies of questionnaire were properly completed and returned. That gave 84 percent response rate. The validity of the instrument was tested using content analysis and the result was good. The reliability was tested using the Pearson correlation coefficient (r). It gave a reliability co-efficient of 0.84 which was also good. Data was presented and analyzed by mean score and Z – test was used to test the hypotheses with aid of Special Package for Statistical Software (SPSS).

Data Presentation and Analyses

The effect of communication effectiveness on minimizing resource wastage of Pharmaceutical manufacturing firms in Cross Rivers State

Table 1: Responses on the effect of communication effectiveness on Minimizing resource wastage of Pharmaceutical manufacturing firms in Cross Rivers State

		5	4	3	2	1	ΣFX	-	SD	Decision
		SA	A	N	DA	SD		X		
1	Effective communication has enhanced coordination among departments in pharmaceutical manufacturing firms in Cross River State, leading to significant reductions in material and time wastage	430 86 34.0	224 56 22.1	198 66 26.1	34 17 6.7	28 28 11.1	914 253 100.0		3.61 1.312	Agree
2	Clear and timely communication ensures that production teams receive accurate instructions, thereby minimizing errors that often result in wasted raw materials and resources	710 142 56.1	224 56 22.1	48 16 6.3	30 15 5.9	24 24 9.5	1036 253 100.0	4.09	1.309	Agree
3	Improved internal communication channels have strengthened information flow, allowing pharmaceutical firms to detect and correct process inefficiencies early	545 109 43.1	224 56 22.1	156 52 20.6	30 15 5.9	21 21 8.3	976 253 100.0	3.86	1.268	Agree
4	Through effective communication, employees better understand operational goals and procedures, promoting careful use of inputs and reducing unnecessary resource losses	505 101 39.9	344 86 34.0	48 16 6.3	16 8 3.2	42 42 16.6	955 253 100.0	3.77	1.312	Agree
5	The adoption of effective communication practices has fostered teamwork and accountability, which together contribute to minimizing resource wastage and improving overall production efficiency in pharmaceutical firms	665 133 52.6	256 64 25.3	24 8 3.2	16 8 3.2	40 40 15.8	1001 253 100.0	3.95	1.309	Agree
Total Grand mean and standard deviation								3.87	1.2866	

Source: Field Survey, 2025

Table 1 shows that a majority of respondents believe good communication improves coordination between departments in Cross River State pharmaceutical companies. About 56.1 percent (142 of 253) agreed that communication has improved coordination, cutting down on wasted materials and time (mean = 3.61, SD = 1.312).

A large portion, 78.2 percent (198 respondents), concurred that clear, prompt communication helps production teams get correct instructions, which lowers mistakes that cause raw material and resource waste (mean = 4.09, SD = 1.309). Also, 65.2 percent (165 respondents) agreed that better internal channels have made information flow stronger, allowing companies to find and fix process problems early (mean = 3.86, SD = 1.258). About 73.9 percent (187 respondents) said that good communication helps workers understand what the company wants to achieve and how things should be done. This encourages them to use resources carefully and avoid unnecessary losses (mean = 3.77, SD = 1.312). Finally, 77.9 percent (197 respondents) agreed that using good communication practices has built teamwork and responsibility, leading to less resource waste and better production in general (mean = 3.95, SD = 1.309).

The effect of team collaboration awareness on high-quality products of Pharmaceutical manufacturing firms in Cross Rivers State.

Table 2: Responses on the effect of team collaboration awareness on high-quality products of Pharmaceutical manufacturing firms in Cross Rivers State.

		5 SA	4 A	3 N	2 DA	1 SD	ΣFX	- X	SD	Decision
1	Team collaboration awareness has strengthened cooperation among employees in pharmaceutical manufacturing firms in Cross River State, resulting in the consistent production of high-quality products	400 80 31.6	376 94 37.2	24 8 3.2	62 31 12.3	40 40 15.8	902 253 100.0	3.57	1.442	Agree
2	When staff members are aware of the importance of teamwork, they communicate and share ideas more effectively, which enhances product formulation and quality control processes.	475 95 37.5	540 135 53.4	24 8 3.2	8 4 1.6	11 11 4.3	1058 253 100.0	4.18	.912	Agree
3	Increased collaboration awareness has improved problem-solving and innovation, leading to better product consistency and compliance with pharmaceutical standards.	665 113 44.7	464 116 45.8	21 7 2.8	24 12 4.7	5 5 2.0	1179 253 100.0	4.66	.880	Agree
4	Awareness of teamwork principles fosters a supportive work environment where departments coordinate efficiently, minimizing errors and ensuring superior product outcomes	330 66 26.1	556 139 54.9	21 7 2.8	68 34 13.4	7 7 2.8	982 253 100.0	3.88	1.032	Agree
5	Pharmaceutical manufacturing firms that promote team collaboration awareness experience greater operational harmony, which directly contributes to producing safe, effective, and high-quality medicines	485 97 38.3	364 91 36.0	36 12 4.7	16 8 3.2	45 45 17.8	946 253 100.0	3.73	1.449	Agree
Total Grand mean and standard deviation								3.87	1.2866	

Source: Field Survey, 2025

According to Table 2, 68.8 percent (174 out of 253) of those surveyed agreed that team collaboration awareness has strengthened cooperation among employees in pharmaceutical manufacturing firms in Cross River State. This cooperation led to the consistent making of high-quality products (mean = 3.57, standard deviation = 1.442). Also, 90.9 percent (230) of those surveyed agreed that when staff are aware of how important teamwork is, they communicate and share ideas better, which improves product formulation and quality control processes (mean = 4.18, standard deviation = 1.912). Ninety point five percent (229) of the people surveyed agreed that more collaboration awareness has improved problem-solving and innovation, in turn leading to better product consistency and compliance with pharmaceutical standards (mean = 4.66, standard deviation = 1.880). Eighty-one percent (205) of the respondents agreed that awareness of teamwork principles creates a supportive work setting

where departments coordinate well, limiting mistakes and ensuring better product results (mean = 3.88, standard deviation = 1.032). Lastly, 74.3 percent (188) of those surveyed agreed that pharmaceutical manufacturing firms that push team collaboration awareness have greater operational harmony, which helps them make safe, working, and high-quality medicines (mean = 3.73, standard deviation = 1.449)

Test of Hypotheses

Test of Hypotheses One: communication effectiveness have significant effect on minimizing resource wastage of Pharmaceutical manufacturing firms in Cross Rivers State

Table 3: One-Sample Kolmogorov-Smirnov Test

	Effective communication has enhanced coordination among departments in pharmaceutical manufacturing firms in Cross River State, leading to significant reductions in material and time wastage	Clear and timely communication ensures that production teams receive accurate instructions, thereby minimizing errors that often result in wasted raw materials and resources	Improved internal communication channels have strengthened information flow, allowing pharmaceutical firms to detect and correct process inefficiencies early	Through effective communication, employees better understand operational goals and procedures, promoting careful use of inputs and reducing unnecessary resource losses	The adoption of effective communication practices has fostered teamwork and accountability, which together contribute to minimizing resource wastage and improving overall production efficiency in pharmaceutical firms
N	253	253	253	253	253
Uniform Parameters ^{a,b}					
Minimum	1	1	1	1	1
Maximum	5	5	5	5	5
Absolute	.340	.561	.431	.489	.529
Most Extreme Positive Differences	.111	.095	.083	.166	.158
Negative	-.340	-.561	-.431	-.489	-.529
Kolmogorov-Smirnov Z	5.407	8.927	6.853	7.780	8.409
Asymp. Sig. (2-tailed)	.000	.000	.000	.000	.000

a. Test distribution is Uniform.

b. Calculated from data.

Source: Researchers' computation from Field Survey Data, 2025

Decision Rule

If the calculated Z-value is greater than the critical Z-value (i.e $Z_{cal} > Z_{critical}$), reject the null hypothesis and accept the alternative hypothesis accordingly.

Result

With Kolmogorov-Smirnon Z – value ranges from $5.407 < 8.400$ and on Asymp. Significance of 0.000, the responses from the respondents as display in the table is normally distributed. This affirms the assertion of the most of the respondents that **communication effectiveness had significant positive effect on Minimizing resource wastage of Pharmaceutical manufacturing firms in Cross Rivers State**

Decision

Furthermore, comparing the calculated Z- value ranges from $5.407 < 8.400$ against the critical Z- value of 0.000 (2-tailed test at 95 percent level of confidence) the null hypothesis were rejected. Thus the alternative hypothesis was accepted which states that **communication effectiveness had significant positive effect on Minimizing resource wastage of Pharmaceutical manufacturing firms in Cross Rivers State**

Test of Hypotheses Two: Team collaboration awareness have significant effect on high-quality products of Pharmaceutical manufacturing firms in Cross Rivers State.

Table 4: One-Sample Kolmogorov-Smirnov Test

		Team collaboration awareness has strengthened cooperation among employees in pharmaceutical manufacturing firms in Cross River State, resulting in the consistent production of high-quality products	When staff members are aware of the importance of teamwork, they communicate and share ideas more effectively, which enhances product formulation and quality control processes.	Increased collaboration has improved problem-solving and innovation, leading to better product consistency and compliance with pharmaceutical standards.	Awareness of teamwork fosters a supportive work environment where departments coordinate efficiently, minimizing errors and ensuring superior product outcomes	Pharmaceutical manufacturing firms that promote team collaboration experience greater operational harmony, which directly contributes to producing safe, effective, and high-quality medicines
N		253	253	253	253	253
Uniform Parameters ^{a,b}	Minimum	1	1	1	1	1
	Maximum	5	5	5	5	5
Most Extreme Differences	Absolute	.438	.659	.655	.560	.493
	Positive	.158	.043	.020	.028	.178
	Negative	-.438	-.659	-.655	-.560	-.493
Kolmogorov-Smirnov Z		6.963	10.483	10.421	8.912	7.843
Asymp. Sig. (2-tailed)		.000	.000	.000	.000	.000

a. Test distribution is Uniform.

b. Calculated from data.

Source: Researchers' computation from Field Survey Data, 2025

Decision Rule

If the calculated Z-value is greater than the critical Z-value (i.e $Z_{cal} > Z_{critical}$), reject the null hypothesis and accept the alternative hypothesis accordingly.

Result

With Kolmogorov-Smirnon Z – value ranges from $6.963 < 10.483$ and on Asymp. Significance of 0.000, the responses from the respondents as display in the table is normally distributed. This affirms the assertion of the most of the respondents that **Team collaboration awareness had significant positive effect on high-quality products of Pharmaceutical manufacturing firms in Cross Rivers State.**

Decision

Furthermore, comparing the calculated Z- value ranges from $6.963 < 10.483$ against the critical Z- value of 0.000 (2-tailed test at 95 percent level of confidence) the null hypothesis were rejected. Thus the alternative hypothesis was accepted which states that **Team collaboration awareness had significant positive effect on high-quality products of Pharmaceutical manufacturing firms in Cross Rivers State.**

Discussion of Findings

Communication's Job in Cutting Waste in Cross River State Pharmaceutical Companies

Hypothesis One shows a calculated Z-value of 5.407 < 8.400, which is bigger than the critical Z-value of 0. This suggests that good communication does help reduce waste in pharmaceutical companies in Cross River State. Kiambuthi (2023) found that almost everyone surveyed thought communication was key to service delivery, rating it 307.32 out of 360 degrees. Similarly, Olugbo et al. (2023) discovered that clear communication improved how well employees did their jobs at Bayelsa Medical University, Yenagoa. They pointed to communication methods, workplace culture, verbal and non-verbal signals, and communication skills as important for good employee communication. Wachira et al. (2023) also found that communication had a big impact on service in water companies in Mount Kenya Region, Kenya.

Teamwork and Making Good Products in Cross River State Pharmaceutical Companies

Hypothesis Two indicates a calculated Z-value of 6.963 < 10.483, which is bigger than the critical Z-value of 0.000. This means that when teams work well together, the pharmaceutical companies in Cross River State make better products. Khadija (2024) found that while different kinds of people working together can boost creativity, it can also cause problems like misunderstandings. Nduhura et al. (2024) discovered that teamwork and good communication improved how well employees in Kampala's small businesses did their jobs. Khassawneh and Mohammad (2025) also confirmed that having a diverse workforce improves how well hospitality businesses in the UAE perform, especially when there is good training and performance reviews.

Conclusion

In summary, good communication and teamwork both help pharmaceutical companies in Cross River State cut waste and make quality products. Cultural variety is key to how well groups work, but the way that variety is handled makes a big difference. To truly benefit from cultural variety, companies need strong leaders, open communication, regular training, and fair HR policies. Cross River State's pharmaceutical industry can improve how well it produces, maintains quality, and competes globally by using organized ways to handle variety.

Recommendations

Based on the findings of this study, the following recommendations are proposed:

- i. Pharmaceutical companies in Cross River State should make their internal communication better by having clear ways to communicate and get feedback. This will stop confusion, help departments work together, and cut waste.
- ii. Pharmaceutical companies in Cross River State should conduct regular team collaboration programs that focus on shared goals, responsibility, and collaboration. Strong teamwork will enhance coordination, reduce mistakes, and help make sure products are of good quality.

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