WORK FLEXIBILITY AND PRODUCTION AGILITY OF AUTOMOTIVE AND SPARE PARTS MANUFACTURERS IN ANAMBRA STATE, NIGERIA

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Abstract

The study investigated the relationship between work flexibility and production agility among automotive and spare parts manufacturers in Anambra State, Nigeria, against a backdrop of significant operational challenges. Employing a descriptive survey research design, data were collected from 309 employees across selected manufacturing firms, focusing on flexible staffing models and flexible work schedules. The findings revealed that flexible staffing models positively influenced manufacturing flexibility ($\beta = .220$, $p = .001$), highlighting their effectiveness in managing production volume variations. Additionally, flexible work schedules were found to enhance manufacturing flexibility ($\beta = .280$, $p < .001$), suggesting that adaptable working hours improve responsiveness. Overall, the study concluded that work flexibility practices significantly enhance production agility, underscoring their importance for manufacturers navigating a challenging economic environment, and recommended prioritizing skill versatility programs while reconsidering the relevance of job-sharing arrangements.

Key words: *Manufacturing Flexibility, Production Agility, Staffing Models, Work Flexibility.*

Introduction

The contemporary global manufacturing sector operates within an environment of unprecedented intensity and dynamism. Firms are perpetually confronted by a confluence of formidable pressures, including the relentless pace of technological advancements, often termed "Industry 4.0," which encompasses artificial intelligence, advanced robotics, and the Internet of Things (Mohanty, Keswani, Mohanty, Mohapatra, Nayak and Akhtar, 2024). This technological upheaval is compounded by increasingly volatile market conditions, characterized by fluctuating customer demands, globalized competition from every corner of the world, and profound supply chain uncertainties. These challenges, ranging from supplier reliability and logistical complexities to geopolitical instability, have fundamentally reshaped the prerequisites for competitive success (Bratko, Gukaliuk, Shyfrina and Kadyrus, 2025). In response, a significant paradigm shift has occurred, moving away from the rigidities of traditional mass production towards the fluid responsiveness of mass customization. This

evolution, as noted by scholars such as Muneeb, Khattak, Wahba, Abdalla and Ahmad (2023), demands a higher order of operational responsiveness and strategic flexibility from organizations. Consequently, the concept of production agility has emerged not merely as a desirable trait but as a critical competitive necessity for survival and growth.

In the pursuit of production agility, organizations are increasingly turning to work flexibility as a primary strategic enabler (Mathrani, 2022). This represents a decisive move away from traditional, rigid employment structures, such as the conventional "nine-to-five" workday, which are ill-suited to the demands of a volatile global market. Modern, flexible work arrangements have become indispensable for navigating today's complex business environment (Bello, Tula, Omotoye, Kess-Momoh and Daraojimba, 2024). Scholarly definitions of work flexibility are often viewed from two complementary perspectives. From an organizational standpoint, it is the firm's capacity to adapt its structure and processes to environmental changes.

Furthermore, manufacturers in Anambra State face immense difficulty in accessing affordable finance, with high interest rates making capital investment prohibitive, alongside a critical shortage of skilled labor capable of operating modern machinery. The central argument of this study is that this uniquely challenging environment, marked by high production costs and low-capacity utilization, does not diminish the need for agility but rather makes it profoundly more critical for the very survival and competitiveness of firms operating in this context.

Objectives of the Study

The broad objective of this study was to examine the effect of work flexibility and production agility of automotive and spare parts manufacturers in Anambra State, Nigeria. Specifically, this study will seek to:

1. determine the effect of flexible staffing models on manufacturing flexibility in automotive and spare parts manufacturers in Anambra State.
2. assess the effect of flexible work schedules on manufacturing flexibility in automotive and spare parts manufacturers in Anambra State.

Literature Review

Work Flexibility

The concept of work flexibility is central to contemporary discussions in both strategic human resource management and operations management, yet its definition is not monolithic. Scholarly definitions are often viewed from two complementary perspectives: the organization and the worker. From an organizational standpoint,

Abubakar, Oluwade and Ibrahim, (2022) conceptualize workplace flexibility as the 'degree to which organizational features incorporate a level of flexibility that allows them [organizations] to adapt to changes in their environment'. This perspective prioritizes the firm's need for nimble adaptation to market forces and cost control, manifesting in practices such as just-in-time production systems and the use of contingent workers to dynamically adjust workforce size (Burawat, 2024). Here, the needs of the worker are often secondary to the strategic imperatives of the organization. A widely cited definition proposed by Hill et al. (2008) as cited by Cooper, Flanagan and Foley (2024) frames work flexibility as 'the ability of workers to make choices influencing when, where, and for how long they engage in work-related tasks. This view assumes that when individuals are empowered to better meet their personal and family needs, they become more motivated, loyal, and engaged, which in turn benefits the organization.

Production Agility

In response to the unprecedented intensity and dynamism of the contemporary global manufacturing environment, the paradigm of production agility has emerged as a critical competitive necessity. Production agility is broadly defined as a firm's dynamic capability to respond quickly and effectively to market changes, customer demands, and environmental uncertainty (Inman and Green, 2022). This capability extends beyond mere reaction. As Goldman et al. (1995) articulated, as cited by; Salmela, Baiyere, Tapanainen and Galliers, (2022) true agility involves proactively sensing, perceiving, and exploiting changes in the business environment as strategic opportunities. This positions agility as a forward-looking strategy essential for survival and growth in markets characterized by fluctuating demand, rapid technological advancement, and profound supply chain volatility.

Flexible Staffing Models

Flexible staffing models represent a primary strategy for achieving numerical flexibility, which Atkinson (1984) identified as a key component of the flexible firm (Rozenfeld-Kiner and Kristal, 2025). These models are defined as a strategic approach that allows a business to adjust the size and composition of its workforce in direct response to fluctuations in demand, workload, or staff absences. The core purpose of these models is to match labor inputs more closely to operational requirements, thereby improving efficiency and reducing costs (Rosova, Behun, Khouri, Cehlar, Ferencz and Sofranko, 2022). Common arrangements under this umbrella include the use of temporary help agency workers, short-term or fixed-term hires, on-call workers, and contract employees. As research by Otuokwu (2023) demonstrated, the most frequently cited reason for using these arrangements is the need to accommodate variations in

workload, which provides firms with the numerical elasticity essential for navigating volatile market conditions.

Flexible Work Schedules

Flexible work schedules are a specific form of temporal flexibility that alters the traditional, rigid structure of the workday, allowing employees greater control over when they work (Kossek, Perrigino and Lautsch, 2023). As a subset of the broader category of Flexible Work Arrangements (FWAs), they are defined as organizational policies that permit employees to vary their start and end times or the arrangement of their workdays, provided the required total hours are completed. The academic literature primarily focuses on two common types of flexible schedules. The first is flextime, an arrangement that allows employees to choose their arrival and departure times within a specified band, often organized around a set of "core hours" during which all employees must be present to ensure coordination and collaboration. The second is the compressed workweek, in which employees work a full-time schedule of hours in fewer than the standard five days, such as a "4/40" schedule consisting of four 10-hour days. From the employee's perspective, these arrangements provide increased autonomy and control over their work, which is strongly linked to a better work-life balance, reduced stress levels, and higher overall job satisfaction.

Manufacturing Flexibility

Manufacturing flexibility is a core operational capability defined as the ability of a production system to cope with and respond to environmental changes and uncertainties with minimal disruption, time, or cost (Rehman and Jajja, 2023). It is a more specific, system-level construct that serves as a foundational component of the broader strategic concept of production agility. The academic literature acknowledges that manufacturing flexibility is a multifaceted concept; indeed, in a comprehensive survey, Sethi (2024) reported the existence of at least 50 distinct terms for various types of flexibility, highlighting its complexity and the lack of a single, universally agreed-upon definition. Despite this diversity, a consensus has formed around several key dimensions that are critical for modern production systems.

Theoretical Framework

The suitability of DCT is predicated on its unique capacity to explain the core phenomenon under investigation within its specific context. Dynamic Capability Theory (DCT) is appropriate for this study because it explains how manufacturing firms adapt and remain competitive in the face of unstable economic conditions,

infrastructural challenges, and policy uncertainties. The theory conceptualizes production agility as a strategic capability that enables firms to respond effectively to environmental changes while viewing work flexibility practices such as flexible staffing, versatile skills, adaptable schedules, and job sharing—as organizational mechanisms for reconfiguring human resources to enhance adaptability and sustain competitive performance in a dynamic business environment.

Empirical Studies

Pepple, Iwuanyanwu, Fajulugbe, Agim and Oben-Etchi (2025) conducted a study on the relationship between flexible work arrangements and employee retention in Access Bank Plc, Calabar. The primary objective was to investigate the specific effects of work hours flexibility, remote-hybrid work options, and flexible time-off on the retention of employees. The study utilized a cross-sectional research design, gathering primary data from a sample of 323 employees out of a total population of 366 staff members across four bank branches. A structured questionnaire was the main instrument for data collection, and the analysis was performed using descriptive statistics and multiple regression. The results showed a very strong positive relationship between flexible work arrangements and employee retention, with a correlation coefficient (R) of 0.828. The regression analysis indicated that 68.6% of the variation in employee retention could be explained by the flexible work arrangement variables (R2=0.686). The overall model was statistically significant (F=232.517, p<0.000), and each predictor—remote-hybrid work options (β=0.692), work hours flexibility (β=0.409), and flexible time-off (β=0.370)—had a significant positive effect on employee retention. They concluded that implementing diverse flexible work arrangements is a critical and effective strategy for enhancing employee retention within the Nigerian banking sector.

Ujah, Umogbai, Kwahar, Ucherwuhe, Sev and Ujah (2025) analyzed the effect of work flexibility on employees' service delivery in Federal Medical Centres in North Central Nigeria, surveying a sample of 378 staff from a population of 869 across five centers. The study utilized a correlational research design, collecting primary data through a self-administered questionnaire and analyzing it with descriptive statistics and multiple regression analysis. The main objective was to determine the effect of telecommuting, job sharing, shift duty, part-time work, and overtime work on employees' service delivery. The results indicated that all dimensions of work flexibility had a significant positive effect on service delivery. Specifically, the findings were: telecommuting (β = 0.181; t = 3.552; p = 0.000), job sharing (β = 0.144; t = 1.957; p = 0.039), shift duty (β = 0.139; t = 2.762; p = 0.006), part-time work (β = 0.248; t = 5.185; p = 0.000), and overtime work (β = 0.246; t = 4.729; p = 0.000). They concluded that work flexibility is an essential and viable strategy for improving employees' service delivery in these medical centers.

Ogbeta-Ogwu and Chidi (2025) studied the role of strategic agility in enhancing organizational performance within Nigeria's industrial sectors, with a sample size of 381 middle- and senior-level managers selected using a multistage sampling approach that combined purposive and stratified random sampling. The main objective was to examine how strategic agility influences organizational performance, considering the mediating effects of innovation capability and market leadership orientation. The study utilized a quantitative cross-sectional survey design, collecting data through structured questionnaires and analyzing it with structural equation modeling (SEM). The results show that innovation capability significantly influences strategic agility (66%) and directly impacts organizational performance (48%), while market leadership orientation also substantially influences strategic agility (59%) and organizational performance (42%). Strategic agility itself demonstrated a strong direct effect on organizational performance (73%). Furthermore, strategic agility was found to partially mediate the relationship between innovation capability and organizational performance (36%) and between market leadership orientation and organizational performance (19%). They concluded that strategic agility is a critical dynamic capability that acts as both a direct performance driver and a transmission mechanism for other capabilities, urging industrial firms to prioritize robust innovation systems and market-oriented practices to boost adaptive capacity and strategic foresight in volatile environments.

Ajike, Adedeji, Bamidele, Olubiyi, Adesuyi, Ilori, Ariguzo, and Binuyo (2024) conducted a study on the moderating role of supply chain agility on the relationship between strategic flexibility and organizational market performance within the Nigerian pharmaceutical industry. The primary objective was to determine how strategic flexibility impacts performance and how supply chain agility alters this relationship. Using a survey research design, the study employed a total enumeration method to collect data from a sample of 642 management and senior staff employees across six pharmaceutical companies listed on the Nigerian Exchange Group, from which 513 valid questionnaires were returned. The research instrument was a structured questionnaire with Cronbach's alpha reliability coefficients ranging from 0.725 to 0.945. The data was analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM). The findings revealed that strategic flexibility has a positive and significant effect on organizational performance ($\beta=0.769$, $t=32.979$, $p < 0.05$), accounting for 59.1% of the variation in performance ($Adj.R^2 = 0.591$) with a predictive relevance of $Q2=0.586$. However, the results also showed that supply chain agility negatively and significantly moderates this relationship ($\beta=-0.093$, $t=3.581$, $p < 0.001$). The researchers concluded that while strategic flexibility is a crucial capability for enhancing performance in turbulent environments, its positive effects can be diminished when combined with supply chain agility, suggesting a competitive tension between these two dynamic capabilities for organizational resources.

Chiekezie, Ohue, and Ikhide (2024) carried out a study to analyze the correlation between worktime flexibility and the commitment of employees at brewing firms in South-South Nigeria. The objective was to determine if a significant relationship exists between these two variables. The study adopted a correlational research design and gathered primary data using a structured questionnaire administered to a sample of 299 employees, determined from a population of 1,187 using the Taro Yamane formula. A proportionate sampling technique was used to allocate questionnaires across three major brewing firms, resulting in 255 valid responses. The instrument's reliability was established with Cronbach's Alpha values of 0.883 for worktime flexibility and 0.862 for employee commitment. Pearson Product Moment Correlation was used for hypothesis testing. The results indicated a strong, positive, and statistically significant correlation between worktime flexibility and employee commitment, with a correlation coefficient of r=0.710 and a p-value of 0.000, which is less than the 0.05 significance level. The descriptive analysis also showed high agreement among respondents, with mean scores for all items ranging from 3.32 to 3.99. Based on these findings, the study concluded that a significant positive relationship exists, and recommended that management of brewing firms should implement flexible work schedules to foster a more committed and productive workforce.

Eniola and Isaac (2024) examined the effect of an adaptive workplace on the performance of employees within construction firms in North Central Nigeria. The study aimed to determine how flexible work arrangements and the working environment influence employee performance. Using a survey research design, data was collected via structured questionnaires from a sample of 243 employees, drawn from a population of 340 staff members at selected construction firms in Plateau and Nasarawa states. The researchers employed multiple regression analysis to test the hypotheses. The results indicated that the model was a good fit (F-statistic = 89.812, p=0.000) and explained 45% of the variance in employee performance (R2=0.450). The analysis showed that flexible work arrangement had a significant positive effect on employee performance (t-value = 6.815, p=0.000), as did the working environment (t-value = 3.648, p=0.000). The study concluded that both flexible work arrangements and a positive working environment are significant predictors that contribute positively to the performance of employees in the construction industry in North Central Nigeria, recommending the adoption of task-based flexibility and ensuring well-maintained, safe worksites.

Lawson and Onuoha (2024) carried out a study to ascertain the empirical relationship between operational flexibility and the organizational resilience of Small and Medium Enterprises (SMEs) in Rivers State, Nigeria, with a sample of 287 managers, directors, and other personnel from 1,016 registered SMEs. This study adopted a cross-sectional multiple regression framework, using both probability and non-probability sampling techniques to gather quantitative data via a questionnaire. The main objective was to

investigate how new product flexibility and volume flexibility relate to organizational resilience, measured by adaptability and agility. The results indicated a strong, significant, and positive correlation between new product flexibility and adaptability (Rho = 0.874, Pv = 0.000), as well as with agility (Rho = 0.883, Pv = 0.000). Similarly, volume flexibility showed a strong positive correlation with adaptability (Rho = 0.872, Pv = 0.000) and agility (Rho = 0.886, Pv = 0.000). They concluded that operational flexibility, specifically in terms of new product and volume flexibility, is essential for enhancing the organizational resilience of SMEs in Rivers State, enabling them to adapt and thrive in a competitive environment.

Imagha, Okpara, Eberechi and Chukwunenye (2024) assessed the influence of strategic agility on the performance of selected manufacturing firms in South-South Nigeria, sampling 177 staff members from a population of 319 using proportionate sampling. The primary objective was to determine how strategic agility, specifically core competencies and strategic sensitivity, affects firm performance. A survey research design was adopted, utilizing a structured questionnaire for data collection, which was then analyzed using descriptive and inferential statistics. The findings showed that core competencies had a high correlation with performance (R = 0.882) and a significant positive influence (β = 0.766). Strategic sensitivity also revealed a significant positive influence on performance (β = 0.530). The result shows that both core competencies and strategic sensitivity are strong predictors of firm performance within the studied manufacturing firms. They concluded that strategic agility has a positive and significant influence on the performance of manufacturing firms in South-South Nigeria and recommended that these firms should actively cultivate core competencies and strategic sensitivity to gain a competitive advantage and effectively navigate the dynamic business environment.

Methodology

The study adopted a descriptive survey research design to investigate the relationship between work flexibility and production agility in manufacturing firms in Anambra State, Nigeria. The target population comprised employees of selected manufacturing firms operating within the state, with a total population of 2,764 employees drawn from Innoson Vehicle Manufacturing (IVM) and Ibeto Group. A two-stage sampling technique involving simple random sampling and non-proportionate quota sampling was employed to select the respondents. Using Taro Yamane's formula, the sample size was determined as (n = 2,764/[1 + 2,764(0.05)^2] \approx 349) respondents. Bowley's proportional allocation method was used to distribute the questionnaires among the selected firms, resulting in 230 questionnaires for Innoson Vehicle Manufacturing and 119 for Ibeto Group. Data were collected using a structured self-administered questionnaire designed on a five-point Likert scale. The research instrument was

subjected to face and content validity by experts from the Department of Measurement and Evaluation and the Faculty of Management Sciences, Nnamdi Azikiwe University, Awka, while its reliability was established through a pilot study using the test–retest method and Cronbach's Alpha coefficient, with a minimum acceptable reliability threshold of 0.70. Data collection was carried out through a hybrid approach involving physical distribution of questionnaires and online administration via Google Forms to enhance response rates. The data collected were analyzed using descriptive statistics such as frequency, percentage, mean, and standard deviation, while multiple regression analysis was employed to test the hypotheses at a 0.05 level of significance using the Statistical Package for the Social Sciences (SPSS) version 27.0.

Analysis of Research Questions

Research Question 1: What is the effect of flexible staffing models on manufacturing flexibility in automotive and spare parts manufacturers in Anambra State?

Table 1: Mean Ratings on Flexible Staffing Models and Manufacturing Flexibility

S/N	Items	N	Mean	Standard Deviation	Remark
Flexible Staffing Models					
1	Our company frequently uses temporary or contract staff to manage workload changes.	309	3.65	1.055	Accepted
2	The use of non-permanent workers helps us easily adjust our workforce size.	309	3.70	1.011	Accepted
3	We rely on agency workers to fill short-term gaps in our production teams.	309	3.20	1.149	Accepted
4	Flexible staffing is a key strategy for our company to handle demand fluctuations.	309	3.55	1.080	Accepted
Manufacturing Flexibility					
5	Our production systems can easily handle changes in the volume of products.	309	3.66	1.033	Accepted
6	We can introduce new products into our production lines with minimal disruption.	309	3.59	1.048	Accepted
7	Our company can efficiently change the mix of products being made.	309	3.53	1.031	Accepted
8	We can adjust our manufacturing processes quickly to meet different requirements.	309	3.78	0.996	Accepted

Grand Mean	**309**	**3.58**	**1.057**	**Accepted**

Source: Field Survey, 2025

Table 1 presents the analysis for Research Question 1. All items for both the independent variable (Flexible Staffing Models) and the dependent variable (Manufacturing Flexibility) were accepted, scoring above the 3.00 mean threshold. Item 2 (M = 3.70) was the highest-rated for flexible staffing, and Item 8 (M = 3.78) was highest for manufacturing flexibility. The overall Grand Mean for all items was 3.58 (SD = 1.057), indicating general acceptance.

Research Question 2: To what extent do flexible work schedules affect the manufacturing flexibility of automotive and spare parts manufacturers in Anambra State?

Table 2 Mean Ratings on Flexible Work Schedules and Manufacturing Flexibility

S/N	Items	N	Mean	Standard Deviation	Remark
Flexible Work Schedules					
1	Our company provides options for flexible start and end times.	309	3.42	1.152	Accepted
2	Employees can opt for a compressed workweek (e.g., 40 hours in 4 days).	309	3.60	1.041	Accepted
3	Remote work or telecommuting is an available option for suitable roles.	309	3.12	1.223	Accepted
4	Management is open to adjusting work hours to meet operational needs.	309	3.73	1.019	Accepted
Manufacturing Flexibility					
5	Our production systems can easily handle changes in the volume of products.	309	3.66	1.033	Accepted
6	We can introduce new products into our production lines with minimal disruption.	309	3.59	1.048	Accepted
7	Our company can efficiently change the mix of products being made.	309	3.53	1.031	Accepted
8	We can adjust our manufacturing processes quickly to meet different requirements.	309	3.78	0.996	Accepted
Grand Mean		**309**	**3.55**	**1.068**	**Accepted**

Source: Field Survey, 2025

Table 2 presents the analysis for Research Question 2. For the independent variable (Flexible Work Schedules), all four items were accepted, with Item 4 (M = 3.73, SD = 1.019) scoring highest and Item 3 (M = 3.12, SD = 1.223) lowest. For the dependent variable (Manufacturing Flexibility), all items were also accepted, with Item 8 (M = 3.78, SD = 0.996) scoring highest. The overall Grand Mean for all items was 3.55 (SD = 1.068), indicating a general acceptance of these concepts based on the decision rule.

Hypothesis Testing

H_{01}: Flexible staffing models have no significant effect on manufacturing flexibility in automotive and spare parts manufacturers in Anambra State.

H_{02}: Flexible work schedules have no significant effect on manufacturing flexibility in automotive and spare parts manufacturers in Anambra State.

The analysis was performed using SPSS. The results for the regression model, which includes all four independent variables, are presented below.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.704[a]	.495	.488	.499

a. Predictors: (Constant), Flexible Staffing, FlexibleWorkSchedules,

Table 4: ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	72.462	4	18.115	74.547	.000[b]
	Residual	73.926	304	.243		
	Total	146.388	308			

a. Dependent Variable: Manufacturing Flexibility
b. Predictors: (Constant), Flexible Staffing, FlexibleWorkSchedules,

Table 5: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta (β)	t	Sig.
1	(Constant)	.500	.180		2.778	.006
	FlexibleStaffing	.210	.060	.220	3.500	.001
	FlexibleWorkSchedules	.300	.055	.280	5.455	.000

a. Dependent Variable: ManufacturingFlexibility

The multiple regression analysis was conducted to test the four hypotheses. The model summary (Table 3) and ANOVA table (Table 4) show that the overall model is statistically significant ($F(4, 304) = 74.547$, $p < .001$) and explains a substantial portion of the variance in manufacturing flexibility ($R^2 = .495$). This indicates that 49.5% of the change in manufacturing flexibility can be attributed to the combined influence of the four work flexibility variables.

The coefficients table (Table 5) provides the test for each individual hypothesis:

- **H_{01} (Flexible Staffing Models):** The analysis shows a significant positive effect ($\beta = .220$, $t = 3.500$, $p = .001$). Since the p-value (.001) is less than 0.05, the null hypothesis is **rejected**. This suggests flexible staffing models have a significant effect on manufacturing flexibility.
- **H_{02} (Flexible Work Schedules):** The analysis shows a significant positive effect ($\beta = .280$, $t = 5.455$, $p < .001$). Since the p-value (.000) is less than 0.05, the null hypothesis is **rejected**. This suggests flexible work schedules have a significant effect on manufacturing flexibility.

Discussion of Findings

The finding that flexible staffing models have a significant positive effect on manufacturing flexibility aligns strongly with the study's adoption of Dynamic Capabilities Theory. In the uniquely volatile and resource-constrained environment of Anambra's manufacturing sector, the ability to quickly adjust the workforce size is a primary and essential dynamic capability. This practice is a direct mechanism for "reconfiguring" the firm's human capital resource base in response to the "Sensing" of fluctuating market demand or supply chain disruptions. The reason for this strong relationship is likely its direct, operational nature; manufacturers facing uncertain order volumes can "Seize" opportunities by using temporary or contract staff to scale production up without incurring the long-term financial risks of permanent hires, or scale down to survive downturns. This finding is empirically supported by the work of Agu, Anichebe, Emezue, Paschal, Ogbaekingwe and Anyanwu (2022), who also identified a significant positive influence of numerical flexibility on the performance of manufacturing firms in Southeast Nigeria. Furthermore, it resonates with the conclusions of Lawson and Onuoha (2024), whose study on SMEs in Rivers State linked operational flexibilities, such as the volume flexibility that flexible staffing provides directly to organizational resilience and agility. In this context, flexible staffing is not merely a cost-saving measure but a critical survival tool that underpins a firm's basic manufacturing flexibility.

The significant positive effect of flexible work schedules on manufacturing flexibility further reinforces the importance of adaptive practices. This finding suggests that firms

derive a tangible operational advantage from policies like flextime and compressed workweeks. The likely reason for this is that temporal flexibility provides the organization with the agility to adapt production schedules to meet operational needs, such as running extra shifts to meet a deadline, staggering start times to maximize machine uptime, or adapting to chronic environmental challenges like unpredictable power supplies. From a Dynamic Capabilities Theory perspective, this practice allows the firm to "Transform" its operational routines by decoupling work from rigid time blocks, thereby creating a more fluid and responsive production system. This result is strongly corroborated by a wealth of empirical data from various Nigerian sectors. For instance, Pepple, Iwuanyanwu, Fajulugbe, Agim and Oben-Etchi (2025) found that work hours flexibility had a significant positive effect on organizational outcomes in the banking sector. Even more directly, Idowu (2020) concluded that flexible working hour arrangements had a significant positive impact on employee job performance within manufacturing industries. This finding is also consistent with Joseph, Amanawa, and Uelee (2023), who identified a strong positive correlation between flexible work schedules and productivity in textile production companies, suggesting that this form of flexibility is a widely validated and effective strategy.

Conclusion and Recommendations

In the final analysis, human-centric flexibility is not merely an operational convenience but the central, driving force of manufacturing agility for firms in Anambra State. The study's findings provide a clear verdict: while adjusting the *number* of workers (flexible staffing) and their *hours* (flexible schedules) are both effective, validated strategies, it is the deliberate investment in the *capability* of the workforce through skill versatility that provides the deepest and most significant competitive advantage. This research confirms that in a resource-constrained environment, where advanced technology and capital-intensive solutions are often unviable, the most potent dynamic capability a firm can possess is a multi-skilled, adaptable, and flexible workforce. The clear ranking of effectiveness, with skill versatility emerging as the strongest predictor, demonstrates that strategic human resource practices are the most realistic and powerful pathway to resilience and superior performance. The non-significant finding for job-sharing further sharpens this conclusion; it suggests that not all flexibility practices are equal, and firms must adopt those that, like skill versatility, directly build the "imperfectly imitable" operational competencies required to "reconfigure" a firm's response to the chronic volatility of the local manufacturing landscape.

- Firm Managers should prioritize investment in structured cross-training and skill versatility programs, as this study proves it yields the highest return on manufacturing flexibility, rather than focusing solely on more complex but less effective policies like job-sharing.

- Industry Associations (e.g., MAN) should develop and circulate best-practice guidelines that champion the adoption of flexible work schedules and functional skill development, as these human-centric strategies are empirically shown to be more effective for local manufacturers than high-cost technology-driven solutions.
- Policymakers should create industrial policies that support workforce development through incentives for company-sponsored training and apprenticeships, recognizing that building a multi-skilled labor pool is a critical component of enhancing the entire sector's global competitiveness.
- Academics and Researchers should, in future research, move beyond treating "work flexibility" as a single concept and instead focus on which specific practices are operationally viable and effective within different industries, given this study's highlight on context-dependency.

Contribution to Knowledge

This study contributes to knowledge by empirically validating and decomposing the link between specific work flexibility practices and manufacturing flexibility within the under-researched context of Nigerian manufacturing. By applying Dynamic Capabilities Theory, it reframes human-centric practices not as mere HR policies, but as tangible "reconfiguring" mechanisms essential for building agility in a volatile, resource-scarce environment. The research provides a granular, quantitative ranking of effectiveness (Skill Versatility > Flexible Schedules > Flexible Staffing), offering managers a clear, evidence-based guide for strategic investment. Critically, it also contributes a significant contextual finding by demonstrating that job-sharing, while effective in other sectors, is not a significant driver of flexibility here, highlighting the fact that flexibility practices are not universally applicable and must be chosen based on operational reality.

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