

**IMPACT OF AUTOMATION ON WORKFORCE SKILLS IN MANUFACTURING  
INDUSTRIES IN EDO STATE**

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**BENIN CITY**

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**A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF VOCATIONAL  
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## **APPROVAL PAGE**

I hereby certify that this work was carried out by OSSAI JULIUS IFECHUKWU with Matriculation number EDU2006125, Department of Vocational and Technical Education, Faculty of Education University of Benin, Benin City.

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## CERTIFICATION

We, the undersigned, certify that this project was carried out by OSSAI JULIUS IFECHUKWU  
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## **DEDICATION**

I dedicate this project to God Almighty for His unwavering guidance, grace, and blessings in my life. I also extend my dedication to my beloved parents, Mr. Julius Ossai Azuka and Mrs. Joy Julius Ossai, whose support has always been invaluable to me.

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## **ABSTRACT**

*This study explores how automation is transforming workforce skills in the manufacturing industries of Edo State. In today's rapidly evolving technological landscape, automation technologies such as robotics, artificial intelligence, and machine learning are not only streamlining production processes but also reshaping the skills required for modern jobs. By surveying workers, supervisors, and managers in key manufacturing hubs across Edo State, the research investigates the extent to which automation increases the demand for technical expertise and alters traditional labor roles. The findings reveal that while automation boosts productivity and opens up new job opportunities, many workers face challenges adapting due to limited training and resources. This study emphasizes the need for continuous learning and strategic collaboration among industries, educational institutions, and government bodies to bridge the skills gap. Ultimately, the research provides practical recommendations aimed at ensuring that the benefits of automation lead to economic growth and enhanced employability rather than job displacement. The insights from this study contribute to policy discussions and offer a roadmap for creating a more skilled, adaptable workforce in Edo State.*

## **CHAPTER ONE**

### **INTRODUCTION**

#### **Background to the Study**

Automation broadly defined as the application of technology to execute tasks with minimal human intervention has emerged as a transformative force in modern industries (International Federation of Robotics [IFR], 2020). Its influence is particularly profound in the manufacturing sector, where advanced technologies such as robotics, artificial intelligence (AI), machine learning, and the Internet of Things (IoT) have significantly enhanced efficiency and reduced operational costs (Brynjolfsson & McAfee, 2014). Over the past decade, industries worldwide have adopted 24/7 production cycles to minimize downtime, improve productivity, and reduce human error (Frank et al., 2019). In many developed countries, automotive plants now rely on robots for welding and assembly, while electronic manufacturers use high-precision automated systems to handle delicate components (Acemoglu & Restrepo, 2018). Makridakis (2017) underscores that AI-driven systems excel at identifying inefficiencies, adapting to optimize performance, and frequently outperforming human workers in speed and accuracy. Although these advancements boost productivity and offer competitive advantages, they also introduce significant labor market shifts. Bessen (2019) observes that automation displaces certain traditional roles while creating new ones requiring specialized skills, such as programming, data analytics, and system optimization. Frey and Osborne (2017) further emphasize that industries dependent on routine manual tasks are particularly vulnerable to job displacement, although new opportunities are simultaneously emerging for workers adept at higher-order cognitive and technical skills.

In industrialized nations, collaborative efforts between governments and private sectors have led to extensive training programs designed to help workers transition to automation-driven roles (Arntz, Gregory, & Zierahn, 2016). However, in developing regions, including sub-Saharan Africa, the pace of automation often outstrips educational and vocational training capacities (Oyelaran-Oyeyinka & Adeya, 2021). This mismatch creates a widening skills gap, leaving workers susceptible to job losses and industries struggling to fill specialized positions.

Edo State, located in southern Nigeria, provides a valuable case study for understanding how global automation trends intersect with regional economic development. Historically, the state has thrived on manufacturing activities such as agro-processing, automotive assembly, textiles, and industrial equipment production, contributing significantly to its Gross Domestic Product (GDP) and employment levels (Osagie, 2019). Examples include large agro-processing plants in Ologbo, automotive-related industries in Ewu, and food processing facilities in Benin City. These businesses are gradually integrating automation to remain competitive, with some adopting AI-driven robotics and sensor-based machinery (Omoregie & Uwadiae, 2020). Nonetheless, smaller and more traditional enterprises in towns like Okada and Ubiaja often lack the financial resources and technical expertise to implement advanced automated systems (Okosun, 2021). This disparity creates a fragmented industrial environment where certain companies rapidly modernize, while others maintain labor-intensive methods. To bridge this divide, government initiatives such as low-interest loans and subsidies could help smaller manufacturers invest in automation. Public-private partnerships can also establish shared technology hubs, providing access to automated tools and expertise without imposing prohibitive costs on small-scale operators.

Automation is bringing major improvements to Edo State's manufacturing sector. With automated systems running around the clock, businesses can reduce downtime and boost productivity (Frank et al., 2019). At the same time, AI-driven machines ensure better product quality by performing tasks with incredible precision, cutting down on errors, and maintaining high standards (Makridakis, 2017). Companies that embrace automation also gain a competitive edge, responding faster to market demands and attracting both local and international investors (Acemoglu & Restrepo, 2018). While some traditional jobs may fade, new opportunities are emerging in areas like programming, system maintenance, and data analysis, paving the way for a more skilled workforce (Bessen, 2019).

In Edo State, automation presents a double-edged sword. While it may displace low-skilled roles, it simultaneously creates specialized jobs requiring advanced technical proficiencies (Frey & Osborne, 2017). For example, technicians trained in predictive maintenance or operators skilled in AI-based machinery are in high demand. Government-led vocational training programs

could help current workers acquire these competencies, thereby mitigating unemployment and ensuring inclusive economic growth.

This study primarily focuses on industries across Edo State rather than on townships. While towns like Benin City, Ekpoma, and Auchi serve as industrial hubs, automation is implemented at the organizational level. Each enterprise's readiness for automation varies based on factors like capital availability, workforce skill levels, and technological know-how.

### **Statement of the Problem**

Automation is transforming Edo State's manufacturing sector in profound ways, reshaping industries, enhancing productivity, and creating new opportunities. One of the most significant advantages is the ability of automated systems to work continuously without the limitations of human fatigue. Unlike traditional manufacturing processes that rely on manual labor with inevitable breaks and downtime, automation enables production lines to operate 24/7, significantly increasing output and efficiency (Frank et al., 2019). This uninterrupted workflow not only reduces production costs but also ensures that manufacturers can meet growing consumer demands more effectively.

Beyond productivity, automation plays a crucial role in improving product quality. AI-driven machinery and robotic systems are designed to execute tasks with extreme precision, reducing human errors that often result in defective products (Makridakis, 2017). These advanced systems follow programmed instructions with consistency, ensuring that each product meets the same high-quality standards. This is particularly important for manufacturers looking to build a strong reputation for reliability and excellence in both local and international markets. When products are of superior quality, companies stand a better chance of competing successfully, gaining customer trust, and securing long-term business growth.

Another key impact of automation is its ability to make Edo State's manufacturing sector more economically competitive. In today's fast-paced global market, businesses must be agile and responsive to shifting consumer demands. Automation allows manufacturers to quickly adjust production processes, scale operations efficiently, and introduce new products without major disruptions (Acemoglu & Restrepo, 2018). This adaptability makes local businesses more

attractive to investors, both within Nigeria and beyond. Foreign investors, in particular, are more likely to support industries that demonstrate efficiency and innovation. By adopting automation, Edo State can position itself as a modern manufacturing hub, drawing investment that stimulates economic development and job creation. While some fear that automation could lead to job losses, it is important to recognize that it also creates new employment opportunities especially in specialized fields. As manual and repetitive tasks become automated, there is an increasing demand for skilled professionals in programming, system maintenance, robotics engineering, and data analysis (Bessen, 2019). These roles require advanced training and technical expertise, encouraging a shift toward a more knowledgeable and highly skilled workforce. This transition can open doors for young people in Edo State, providing them with career paths in technology-driven fields that offer greater job security and higher salaries. Moreover, automation fosters innovation by freeing human workers from monotonous tasks, allowing them to focus on creative problem-solving, product development, and process optimization. When employees are given the opportunity to work alongside intelligent machines rather than being replaced by them, businesses can harness the best of both worlds, human ingenuity and technological efficiency. This balance between automation and human labor is key to ensuring that the workforce remains dynamic, adaptable, and capable of driving the manufacturing sector forward.

In the long run, the integration of automation in Edo State's manufacturing sector will not only modernize industries but also contribute to broader economic growth. As businesses become more efficient and competitive, they generate higher revenues, which can be reinvested into infrastructure, education, and technological advancement. A thriving manufacturing sector also strengthens local supply chains, reducing dependency on imports and boosting the region's overall economic resilience. Ultimately, automation is not just about replacing traditional processes with machines—it is about transforming Edo State's manufacturing sector into a high-performing, future-ready industry. By embracing these advancements, businesses can unlock new opportunities, workers can gain valuable skills, and the state can establish itself as a leader in industrial innovation.

### **Purpose of the Study**

The main purpose of the study is to analyze key factors influencing the impact of automation on workforce skills in Edo state, specifically the study seeks to find the following:

1. Determine the specific effects of automation on workforce skills in Edo State's manufacturing industries.
2. Examine how automation technologies have reshaped traditional labor roles in key areas like Benin City, Ekpoma, and Auchi.
3. Evaluate the extent to which workers are adapting to the technical demands introduced by automation in Edo State.
4. Assess the availability and effectiveness of training and capacity-building programs preparing workers for automated systems.

### **Research Questions**

The following research questions were raised to guide the study:

1. What are the specific effects of automation on workforce skills in Edo State's manufacturing industries?
2. How have automation technologies reshaped traditional labor roles in key manufacturing locations such as Benin City, Ekpoma, and Auchi?
3. To what extent are workers in Edo State's manufacturing sector adapting to the growing demand for technical skills brought about by automation?
4. How effective are current training and capacity-building programs in preparing workers for automation technologies in Edo State?

### **Hypotheses**

The following null hypotheses were formulated to be tested at 0.5 level of significance:

H<sub>01</sub>: Automation does not significantly affect workforce skill requirements in Edo State's manufacturing industries.

H<sub>02</sub>: Automation technologies have not substantially transformed conventional labor roles in locations such as Benin City, Ekpoma, and Auchi.

H<sub>03</sub>: Workers in Edo State's manufacturing sector are fully adapted to the new skill demands introduced by automation.

H<sub>04</sub>: Current training and capacity-building initiatives in Edo State are sufficient for preparing workers for automation.

### **Significance of the Study**

This study will be of immense benefits to the following persons;

**Policymakers.** By examining how automation is reshaping the manufacturing landscape in Edo State, the findings will help inform the creation of supportive labor and industrial policies. The aim is to ensure that government decisions are well-informed and positioned to address both the opportunities and risks presented by evolving technologies.

For industry stakeholders, this research is equally beneficial. It highlights the impact of automation on workforce skills and provides a roadmap for developing targeted training programs. With this information, industry leaders can boost productivity, foster innovation, and better prepare their organizations for the technological shifts that are transforming the sector.

Educational institutions will also gain significant guidance from the study. The insights offered will help these institutions align their curricula with the current and future demands of technology. By incorporating these recommendations, schools and training centers can equip students with the relevant competencies needed to succeed in an automated manufacturing environment.

Lastly, students are among the primary beneficiaries. The study identifies the most sought-after skills in a technologically advanced manufacturing setting, enabling students to tailor their education accordingly. This targeted approach not only enhances their employability but also facilitates a smoother transition into the workforce, ensuring they remain competitive in a rapidly changing job market. Overall, by addressing the needs of these diverse groups, the study contributes to Edo State's socio-economic development by promoting a prepared, adaptable workforce that can leverage automation for sustainable growth.

### **Scope of the Study**

The study focuses on manufacturing industries within Edo State, examining how automation impacts skill requirements, worker adaptability, and the efficacy of existing training programs. Geographically, it encompasses diverse industrial areas such as Benin City, Ekpoma, and Auchi, among others. The time frame of the study covers the recent surge in automation adoption over the past five years, providing a contemporary overview. This scope is deliberately limited to Edo State due to its unique industrial environment, the relevance of automation to local manufacturing, and feasibility in terms of data collection from regional stakeholders. The findings and recommendations aim to guide policy, practice, and future research specific to Edo State's socio-economic context.

### **Operational Definition of Terms**

The following words were operational defined

- **Automation:** The technique of making an apparatus, a process, or a system operate automatically.
- **Workforce Skills:** The knowledge, abilities, and competencies that people need to succeed in the job market and contribute to their organizations
- **Manufacturing Industries:** Those industries that transform materials, substances, or goods into new products.
- **Edo State:** Edo State is a state found in the southern region of Nigeria.
- **Job Displacement:** The involuntary loss of employment due to various factors such as economic downturns, technological advancements, company restructuring, or offshoring.
- **Skills Gap:** The difference between the skills an employer needs from their employees and the skills that the employees actually have.
- **Technical Skills:** The specialized knowledge and expertise required to perform specific tasks and use specific tools and programs in real-world situations.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

The chapter present the review of relevant and related literature. They are presented under the following sub-headings.

- Concept of Workforce Automation
- Components of Workforce Automation
- Automation and Workforce Skills
- Importance of Workforce Skills to Manufacturing Industries
- The Concept of Skill Development
- Problems and Challenges Facing Workforce Skill Development
- Role of Training Programs in Workforce Development
- Factors Hindering the Implementation of Effective Training Programs
- Ways of Managing the Factors Hindering Effective Training Programs
- Review of Related Empirical Studies of Literature Reviewed
- Summary of Reviewed Literature

#### **Concept of Workforce Automation**

The automation of the workforce signifies a profound change in the way industries operate by employing technology to execute jobs that humans have historically done. This concept is built on the utilization of modern technology such as robots, artificial intelligence (AI), machine learning. and other autonomous systems. To increase efficiency, increase output, and lessen reliance on human labor. These technologies are no longer cutting-edge ideas. It is shaping sectors across the world, including the industrial sector in Edo State.

One of the two key drivers of labor automation is the ability to do jobs with precision and regularity. This often exceeds human capacities in repetitive occupations. It is labor intensive. For example, automation in the processing industry in Edo State has improved production lines. This guarantees that operations such as assembly, sorting and packing are accomplished quickly. Robotic devices conduct these processes with minimum downtime, it helps enhance overall operational efficiency and decrease production costs. Additionally, worker automation goes beyond replacing human effort. It redefines functionality and creates new chances for innovation. Automation helps the sector to examine vast volumes of data in real time, using AI and machine learning to predict maintenance concerns. Optimize production schedule and discover possibilities for cost savings. This information helps companies able to make decisions using all information to maintain competitiveness in the global economy and promote economic growth

In Edo State, the rise of automation has led to a substantial shift in labor dynamics. Traditional functions are being reinterpreted. There is an increased emphasis on technical skills. Understanding labor automation includes understanding how technological innovations are altering traditional labor practices. This is especially evident in the industrial environment of Edo State. Automation has the combined traits of invention and acceptance. It is transforming the industry to combine technologies such as robots, artificial intelligence. and machine learning integrated into everyday operations. This shift is not merely a technical advancement. Rather, it is a fundamental shift that reshapes the connection between technology and human capabilities.

The value of automation resides in its potential to improve production outputs, reduce costs, and improve operational accuracy. However, implementation offers obstacles. This is especially true for individuals who are used to working in traditional ways. The change to automation requires an understanding of how employees will adapt and prosper in a technology-driven environment. This includes addressing talent gaps. Promote flexibility and develop training programs that fit the needs of the new industry.

### **Components of Workforces Automation**

Employee automation uses several technical advancements. It is revolutionizing the way the industry works. These components work together to improve the process. Increase efficiency and rethink the skills required in modern production. Here is a thorough view of the two key components:

- Robotics

Robotics plays a significant function in workforce automation. Automated machines are designed to do complicated activities with precision, speed, and consistency that exceeds human capabilities. In manufacturing, robots undertake activities like as assembling, welding, packing, and material handling. Helps eliminate errors and boost productivity Collaborative Robots or “cobots” work along with humans to increase efficiency without entirely replacing human labor.

- Artificial intelligence (AI)

AI systems allow robots evaluate vast volumes of data, make choices, and execute jobs that formerly needed human intelligence. In manufacturing, AI is used for predictive maintenance. Adjust production schedule accordingly and speed up quality control. These systems can spot trends and irregularities. To ensure that operations work smoothly and at the same time reduces downtime and waste.

- Machine learning

As a subset of AI, machine learning focuses on designing algorithms that allow computers to learn and improve with experience. Without explicit programming, for example, machine learning systems in manufacturing might predict equipment faults by reviewing prior data. Improved maintenance schedule and reduce unscheduled downtime. This ability to self-improve is especially critical in settings that necessitate constant adaptability and optimization.

- Automation system

Automation brings up various technologies that improve industrial operations. It consists of automated assembly lines, transportation systems and quality control devices that function with minimal human intervention. These systems integrate sensors, actuators, and control units to assure perfect functioning. From material handling to final product inspection

- Internet of Things (IoT)

This is because IoT technology connects equipment and systems across the production. This makes it feasible to collect and exchange information in real time. Sensors integrated in machinery provide information about their performance. Power usage and maintenance demands

this relationship enhances openness and decision-making. Promote a more dynamic and efficient manufacturing environment.

- Big data analysis

Automation is facilitated by the ability to evaluate enormous data sets created during the production process. Big data analysis helps detect trends, increase efficiency in resource allocation and increase operational efficiency. For example, study of production data can show gaps or possibilities for cost reduction.

## 7. Cloud computing

The new foundational platform enables data to be stored, processed and shared across locations, from workforce automation up to processing in new support centralized automation monitoring and management. This ensures that operations remain synchronized and scalable.

These components jointly drive the evolution of the manufacturing landscape, making processes more efficient and lowering reliance on manual labor for repetitive activities. However, this transition comes with substantial ramifications. Workers must acquire new skills to manage, maintain, and maximize this technology. The demand for knowledge in areas such as programming, system integration, and data analysis shows the transition toward a more technically proficient workforce.

In essence, the components of workforce automation are not just tools—they constitute a paradigm shift in how industries operate. Understanding and using these technologies is vital for industries to remain competitive and for workers to adapt and succeed in an increasingly automated world.

## **Automation and Workforce Skills**

The introduction of automation in the industrial sector has significantly changed the skill requirements of employees. By redefining work and professional expectations. This change is not just a technological evolution. But it is a profound change in the way we work, create challenges and opportunities for employees.

- Characteristics of the Development of Professional Functions

Automation has replaced routine manual tasks such as repetitive assembly, or simple quality inspection with machines and software that can work faster and more accurately. This will help increase efficiency. It also eliminates functions that previously relied heavily on manual labor. At the same time, new functions are created. That requires advanced technical abilities. The worker is now obliged to possess:

- Technical Skills: The ability to operate, troubleshoot, and maintain machinery and automated systems is essential. This includes understanding robots, Artificial intelligence (AI) and other technologies that drives automation
- Analytical skills: Automated systems handle large volumes of data. And operators need to have the skills to analyze and interpret that data to make informed decisions. These skills are critical in optimizing processes, trend forecast and correcting inefficiencies.
- Higher cognitive skills: Problem solving, critical thinking and the ability to adapt becomes more valuable. This is because the automatic system has to take on repetitive tasks. Human workers are therefore focused on tackling complex and creative challenges that machines cannot easily solve.

- Addressing the Skills Gap

The growing pace of automation often leads to a skills mismatch, where existing employees do not have the appropriate qualifications for the new job closing this gap is crucial to preserving productivity and assuring employee pregnancy. It concludes:

- Sector-specific training programs: Tailored programs that focus on specific technology and skills important to the manufacturing sector.
- Cooperation with educational institutions: Developing a curriculum in line with industrial needs guarantees a swift and rapid flow of qualified graduates to satisfy the needs of automation.
- Government and policy support: Policies that promote lifelong learning and provide financial incentives for training efforts can play an essential role in narrowing the talent gap.

- Personnel Development Opportunities

Automation while disruptive, provides opportunity to accelerate workforce:

- It drives the formation of high value organizations. Become more mentally engaged and squander fewer physical resources
- Employees who adapt to changing demands will experience career progress and security in an industry that is prepared for the future.
- Companies will profit from a more competent and efficient workforce. Helps enhance competitiveness and creativity.

- **The Role of Thought and Adaption**

In addition to technical expertise adopting an attitude of continual learning and adaptation is vital for employees to prosper in an automated environment. Automation will continue to develop. And being able to keep up with these developments through continued education and skills development is crucial.

Automation has a huge influence on people's abilities. This requires a strategic and collaborative approach to workforce development. By investing in training Promote adaptability and emphasize lifelong learning various industries able to navigate this change along and training employees to succeed in an increasingly automated environment.

### **Importance of Workforce Skills to Manufacturing Industries**

The competence of personnel is of major importance for achieving effective industrial activity. Most of them are dominated by automation. The changing reality of modern production necessitates people who are not simply capable of using the latest technology. But they also have the flexibility to adapt to the needs of a more automated environment in Edo State, where processing businesses play a vital part in the economy. Personnel capabilities are vital not only for immediate operational efficiency. but also, for long-term sustainability, growth, and competitiveness in the global market.

- **Increase productivity and efficiency**

A talented workforce is vital to harnessing the potential of automation technology. Effective automation still requires human oversight and engagement in maintenance. Troubleshooting and

optimization. Skilled workers are needed to assure that the automated system functions without difficulties. This enables for outstanding performance with minimal downtime. By comprehending the intricacy of automatic machines, operators can then proactively identify potential difficulties. Perform preventative maintenance and repair technological issues that may hinder production. This results in a more productive team. And it guarantees that the factory has no idea of efficiency.

Additionally, competent personnel are crucial to maximizing the integration of new technology into old systems. When people have the necessary skills, they can adjust to new technology more rapidly. Reduce the learning curve and facilitate the transition to completely automated procedures. The faster staff adjust, the better. The less delays or disruptions your production processes will face.

- Improving product quality and consistency

One of the key benefits of automation is its capacity to deliver a more consistent and accurate product. However, this potential can only be captured if personnel are taught to monitor, calibrate, and troubleshoot automation. Skilled staff guarantee that machinery is put up correctly. They make the necessary adjustments to preserve product quality. Additionally, individuals that understand quality control can cooperate with automated technology to increase the accuracy and uniformity of the final product. This leads to fewer defects. Less waste and more delighted customers in Edo State where the local industry is committed to creating a reputation for quality products. Skilled workers are the backbone of industrial operations that meet or exceed industry standards. These are vital to ensure that the finished product fulfills the expectations of both domestic and foreign consumers.

- Supporting the growth and development of the manufacturing sector in Edo State

Edo State's industrial sector is the engine of the economy. And investing in workforce skills is critical to continued growth. As automation continues to improve farms The demand for skilled workers will only increase. Employees who are skilled at using and maintaining automated systems are not only more efficient. but also, more adaptable This is important for the ever-changing needs of the industry. Government investment in workforce training and development has the potential to have a lasting impact. More skilled workers contribute to the economic prosperity of local communities. Skilled workers attract investment. Create new business opportunities and increase the state's competitiveness at the national and global levels.

This, in turn, can lead to more employment opportunities. Better living conditions and a stronger local economy

- Sustainable growth or long-term industry

In the long run, the importance of talent cannot be overstated. The transformation sector depends on continuous innovation. and relevant workers must have the necessary skills to drive that innovation. A skilled workforce that has the ability to ideate, implement, and improve automation technology. will be the leader of this change Employees must continually adapt as new technological advancements emerge, and those with the right skills can confidently embrace these changes.

In addition, by promoting a culture of continuous learning and skill development. Transformation industries in Edo State will be able to create a more resilient and future-ready workforce. This will help these industries navigate the uncertainties of a globalized and technologically advanced market. To ensure continued success and growth

### **The Concept of Skill Development**

Capacity development is a dynamic and continuous process that aims to provide individuals with the information, skills and abilities necessary to carry out their activities effectively and successfully. In the era of rapid technological development This is especially true with the introduction of automation. Capacity development is more important than ever. Employees must continually upgrade their skills to stay relevant in their organizations. and keep up with changes in technological needs in the context of automation Competency development is more than general vocational training. It covers a broad set of capabilities that help people adapt to automation. Use new technology and participate in decision-making processes that use the information presented by these systems.

Because various industries Integrate more automation into operations The nature of talent needs will change. In the past, workers had to rely heavily on manual labor. Currently, there is an emphasis on technological capabilities. analytical ability and the intellectual ability to manage increasingly complex careers. Automation technologies such as robotics, artificial intelligence (AI), and machine learning Require employees to develop specialized skills Including the ability to solve problems in automatic systems Analyze large data sets and use high-level thinking to solve problems that arise automatic environment This change requires that capacity

development requires continuous and lifelong effort. with opportunities for improvement and re-qualification throughout an individual's career.

Effective skill development programs are vital to ensuring that the workforce is prepared with the correct balance of technical, analytical, and cognitive abilities needed to prosper in automated industries. These programs must be tailored to address the special demands of workers in the context of automation. For example, vocational training centers, online learning platforms, and on-the-job training programs should provide workers with hands-on experience in dealing with automation technology, while simultaneously supporting the development of analytical and problem-solving skills.

### **Problems and Challenges Facing Workforce Skill Development**

While developing workforce capabilities is important to preparing workers to meet the demands of automation remains to be seen. They face many obstacles that can seriously affect their performance. These difficulties are the result of both structural issues and personal barriers that influence employees' ability to select and implement new competencies in a rapidly changing industrial environment. Some of which are:

- Resistance to change

Resistance to change is one of the biggest barriers to employee skills development. Many officials fear that the advent of automation will make their businesses obsolete. This causes dissatisfaction and financial uncertainty. This concern may lead to reluctance to participate in training courses or acquire new technology. Another resistance driving some workers is the feeling that they are overwhelmed by the speed of technological development or the lack of certification in their ability to acquire complex technical abilities.

Such a move is not something officials oppose. Entrepreneurs and leaders in industries that are considered expensive or futile can rely on funding for a full training program. Overcoming this resistance requires developing a culture that promotes continuous learning. and ensuring that employees develop their abilities as opportunities for career growth and does not pose a threat to the security of the operator.

- Lack of access to training

Access to quality training programs is a vital aspect for successful talent development. But it remains a huge impediment. This is especially true in underprivileged communities such as those in distant districts of Edo State. Lack of infrastructure and resources typically limits the availability of facilities and training programs for specific automation technologies. Local officials may struggle to find opportunities to build the technical and analytical talents needed to operate and manage automated equipment.

Moreover, this is despite the fact that a training program has been developed. This may not be a financial requirement for many people. Exorbitant expenses for specialist courses This is linked with the loss of incentives that may occur during training participation. Participation may be limited. Meeting this challenge needs expanding access to high quality, affordable training programs. and the use of technology such as online learning platforms, to reach a bigger population.

- Skills gap

The disparity between the competencies employees has and the capabilities required for modern automation - is another key worry. These gaps often occur because of traditional educational and training organizations. Unable to keep up with rapidly increasing automation technology as a result, authorities may not have abilities in areas such as robotics and dice analysis. or advanced troubleshooting as a result, they are unprepared for the demands of an automated workplace.

Skills shortages don't simply harm individuals. But it also has a wider impact on the industry. Inefficiency Decreased productivity and higher operational losses might arise when employees are unable to successfully interface with automated technologies. Closing these disparities requires cooperation from educational institutions. Industry leader and politicians to connect training curricula with the current and future needs of the automation-driven industry.

- Insufficient support for entrepreneurs

Lack of company support may further increase the issue of building competences at work. Some companies may consider training as a short-term waste and not a long-term investment. As a result, insufficient resources are allocated for staff development. If there is no genuine

help from the organization Employees would be compelled to face problems in learning skills. This can be scary and less productive.

Entrepreneurs also play a crucial role in offering practical experience and mentoring opportunities that encourage capacity development. When this support is not adequate Employees miss out on the hands-on learning opportunities that are important to mastering automation technology.

- Rapid technical progress

The high speed of technical advancement in automation creates distinct obstacles for skills development. When employees begin to comprehend specific technologies Fundamentals and other systems. This constant growth generates a mobile environment for training programs. It should be updated regularly to stay relevant. Following this evolution demands a flexible and agile strategy for developing capabilities. It promotes lifelong learning and the ability to rapidly acquire new competencies. However, this may not be possible to do without a well-coordinated effort from training providers, companies and policymakers.

Overcoming these issues involves a number of approaches:

- Promoting a culture of learning: Entrepreneurs and politicians may highlight the benefits of developing talent and build stability in entrepreneurship to lessen resistance to change.
- Expand access to training: Investing in infrastructure and technology helps boost training programs into neglected areas. More subsidized courses and more flexible learning options could make it more accessible.
- Aligning training with industry needs: Educational institutions and training providers should engage constructively with companies. This ensures that the curriculum is relevant and modern.
- Promoting business participation: Incentives such as tax refunds or subsidies. It can incentivize those enterprises, actively supporting employee training efforts.
- Developing adaptive training programs: Programs must be organized to predict and adapt to technology developments. Help the team move forward to new things. and numerous processes with care

## **Role of Training Programs in Workforce Development**

Training programs play an important role in equipping people with the necessary competencies to meet the demands of the developing industrial world. These programs not only aim to teach new techniques, but also aim to inspire people to adapt, develop, and succeed in their endeavors. Industry Training programs bridge the gap between traditional methods and the requirements of automation technology. Employees learn how to handle complex machinery. Solve problems with automation and understand the information needed to make decisions, this guarantees that people remain a valuable asset to the operator. Technology is changing the nature of entrepreneurship.

Additionally, the training program creates a culture of continuous learning. where employees are encouraged to develop high levels of cognitive and analytical skills. This is especially important in Edo State. The adoption of technology requires a strategic focus on building capabilities to maintain productivity and competitiveness.

These programs also serve as a platform for cooperation between companies and educational institutions. By customizing training to meet the specific needs of local companies. They ensure that employees are well prepared for the technology and processes specific to their region.

Finally, training programs have a sequential impact on the overall economy. Skilled workers attract investment, support industry growth and lead to being an entrepreneur. For Edo State This means a more resilient and prosperous industrial sector able to compete on a global level.

### **Factors Hindering the Implementation of Effective Training Programs**

There are many obstacles that prevent effective operations. As described below Economic, social, technological, and institutional barriers can all contribute to these problems.

- Insufficient cash and resources

A key difficulty is the absence of enough resources to establish, execute, and sustain training programs. Limited financial resources restrict the establishment of sophisticated training facilities. Purchasing state-of-the-art equipment and recruiting skilled trainers This financial mismatch is a severe problem especially in developing regions such as Edo State.

- Access to training possibilities is limited.

Workers in remote or underserved locations may not be able to access training programs owing to geographic limitations. The lack of decentralized training facilities means that many workers are not participating in skills development efforts. This leaves them unprepared for the issues connected with automation.

- Unstable training curriculum

Many training programs have failed to keep up with the rapid improvements in technology that promotes automation. When a curriculum is out of date or not linked with current industrial needs such courses do not equip personnel with the essential competencies to efficiently manage complex systems or adapt to technological advances.

- Resistance to change

Officers and operators may be reluctant to enroll in training programs due to mobility. Uncertainty about becoming an entrepreneur or thinking about the benefits of new abilities. This hesitation inhibits efforts to establish a culture of continual learning and flexibility in the workplace.

- Lack of qualified teaching staff.

The lack of qualified and knowledgeable trainers is a huge challenge. If there are no qualified specialists to organize high-quality training. Employees will not be able to receive the guidance they need to develop the skills needed in their local automated workplace.

- Technological barriers

Integrating technology into training programs, such as e-learning platforms and virtual simulations. This is typically hampered by inadequate infrastructure. Access to the internet, computers, and other technical gadgets. Limited dependable training can hamper the efficient implementation of new training approaches.

## **Ways of Managing the Factors Hindering Effective Training Programs**

Effective training programs are crucial to provide employees with the skills they need to succeed in automation. However, various obstacles must be solved to guarantee these programs have an impact. Here are some strategies for coping with these problems effectively:

- Increase investment in training programs

One major barrier to effective training programs is insufficient funds. To combat this situation Both government and industry need to focus on investing in worker development. Public funds can be used to build modern training facilities. and subsidies for training for workers. On the other hand, these industries may spend little on human development. This guarantees long-term efficiency and creativity.

- Decentralized training facilities

Lack of accessible training institutions in rural and underprivileged areas is a major problem. The establishment of decentralized training centers ensures that workers across Edo State regardless of location will have access to quality programs, mobile training units or online learning platforms can be of greater help in widening the gap for those who are unable to travel to a physical location.

- Regularly update training courses.

Automation technology changes frequently. This makes the training program have to go hand in hand. Training organizations must regularly update their programs to meet current industry requirements. Collaboration with industry experts and technical educational institutions is essential in designing curricula that educate workers with the competencies needed for future technologies such as robotics, AI and advanced data analytics.

- Promote a culture of lifelong learning.

The biggest barrier to participation in training is aversion to tolerance. Staff can be involved with enrollment in various programs due to insufficiency or interruption of the operator. Entrepreneurs and governments can promote a culture of lifelong learning by increasing

participation in training. refueling Career advancement opportunities and financial incentives for skill development can encourage individuals to embrace continuous learning.

- Improve cooperation between the public and private sectors.

Collaboration between government agencies, private sector, and educational institutions is crucial to the effectiveness of training programs. This is because cooperation between the public and private sectors can facilitate the exchange of resources. Specialized knowledge and wealth in various industries might be regarded as missing specialized abilities. This is because governments and educational institutions are actively designing and providing specialized training programs to cover these shortages.

- Use technology to organize or train.

Integrating technology into our training programs solves concerns relating to access and cost. Online learning platforms' virtualization and gamified training architecture can enable personnel have a more flexible and engaging learning experience. These technologies can be tailored to meet the specific needs of the sector. This leads to more full and effective training.

### **Review of Related Empirical Studies of Literature Reviewed**

The impact of automation on workforce development has been extensively examined, providing insights into its revolutionary implications on industries and economies. A study on Nigeria's oil and gas industry emphasizes the simultaneous potential and challenges automation provides. While automation can boost efficiency and productivity, restricted access to training programs and the rapid evolution of technology frequently prevents successful workforce adaptation. This study highlights the critical need to build new capabilities. and increase existing abilities to bridge the gap between existing capabilities and automation requirements (Top Journals, 2023). In the wider context of Africa, the Global Development Research Center highlights the impact of automation and artificial intelligence (AI) on development possibilities on the continent. Research shows that automation offers opportunities for economic advancement. But it also faces concerns about employment disruptions. This is especially true for low-skilled individuals. This highlights the importance of measures that address these risks. Even growth or even rhythm. (Center for Global Development, 2023).

Additional information is obtainable by way of the International Monetary Fund. Which evaluates people' opinions of automation. The look at revealed that older people and those with decrease salaries have been more likely to have poor sentiments regarding automation. This is because there is a risk of job loss and financial instability. This means the need for social safety nets and precise interventions to alleviate stress and maintain working group resilience. (International Monetary Fund, 2023)

In Nigeria Research on AI's Impact on Entrepreneurship Emphasizes the need for continuous improvement of competence and professional training. By investing in education and talent acquisition Many companies are able to train top employees to develop into an AI-competent workforce, minimizing the chance of being disrupted. (Lawal, 2023).

In the same way A Global Public Policy Institute discussion paper analyzes the impact of automation in Sub-Saharan Africa, highlighting the need for strategic planning to address its disruptive consequences. This makes perfect sense in a sector that is normally established in financial terms. (Global Public Policy Institute, 2023)

Overall, these findings underline the essential need to adapt workforce development programs to the reality of automation. I also advocate for a united effort by government, industry and academia to guarantee that people have the skills needed to flourish in an automated future.

## **Summary of Reviewed Literature**

This chapter delves into the transformative impact of automation on the industrial workforce in Edo State, exploring not only the technical aspects but also the human dimensions of this shift. It begins by unpacking the concept of labor automation and its key components, illustrating how innovations such as robotics, artificial intelligence, and machine learning are revolutionizing traditional industrial practices.

The narrative emphasizes that automation is far more than a means to reduce reliance on human labor, it is a powerful tool for driving productivity and, importantly, for empowering workers. As industries evolve to meet growing demands, it becomes crucial to equip individuals with the skills and knowledge necessary to thrive in a tech-driven environment. This human-centric

perspective underscores that while technology propels us forward, the real progress lies in the ability to uplift and support the workforce.

A significant portion of the chapter is devoted to examining the training needs that emerge from this technological transition. It critically evaluates the challenges that industry leaders face, including identifying and overcoming obstacles in current training programs. In doing so, the chapter scrutinizes the effectiveness of two distinct training initiatives aimed at bridging competency gaps and closing the talent void that can hinder progress.

Moreover, the discussion advocates for the design of flexible, adaptive training strategies tailored to the evolving needs of the new industrial landscape. By highlighting the importance of continuous learning and professional development, it argues that closing the talent gap is essential for not only maintaining competitiveness but also for ensuring that the workforce is resilient, adaptable, and ready to embrace the future.

Ultimately, this chapter paints a comprehensive picture of how automation is reshaping the industrial sector in Edo State. It intertwines technological advancements with the human story of growth, resilience, and empowerment, reinforcing the idea that successful industrial innovation hinges on nurturing and uplifting the very people who drive it forward.

## **CHAPTER 3**

### **METHODOLOGY**

The method that will be used for this study is presented under the following sub-headings:

- **Research Design**
  
- **Population of the Study**
  
- **Sampling and Sampling Technique**
  
- **Research Instrument**
  
- **Validity of the Instrument**

- **Reliability of the Instrument**
- **Method of Data Collection**
- **Method of Data Analysis**

### **Research Design**

This study adopts a descriptive survey design. According to Ewuruique (2019), a descriptive survey is devoted to gathering information about current conditions or situations for the purpose of description and interpretation. This design allows the researcher to collect data from a broad population of manufacturing industry stakeholders in Edo State, capturing their views on how automation influences workforce skills.

### **Population of the Study**

The target population for this study comprises workers, supervisors, and managers employed in manufacturing industries located in Edo State. Specifically, the population includes skilled and semi-skilled employees in key manufacturing hubs such as Benin City, Ekpoma, Auchi, and other industrial clusters within the state. This ensures that the study reflects a wide range of perspectives regarding the impact of automation on workforce skills.

### **Sampling and Sampling Technique**

A stratified sampling technique will be utilized to guarantee participation from all relevant stakeholder groups. Teachers will be separated into classes, it depends on the function (e.g. worker, manager, political decision maker and educators) to create balanced representation. From each stratum, participants were randomly picked to ensure fairness and eliminate bias. A total of 100 people will be involved in the study, comprising 55 workers, 15 managers, 5

policymakers, and 5 educators. This sample size was regarded sufficient to generate relevant insights while staying manageable for analysis.

### **Research Instrument**

A questionnaire will be used for data collection. It is divided into two sections, section A (Demographic Information), gathers data on gender, age and job role, section B (Item Statements), consists of 4 items addressing the research questions on automation and workforce skills. Each item is rated on a 4-point Likert scale, Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD) to capture respondents' levels of agreement or disagreement.

### **Validity of the Instrument**

The questionnaire underwent scrutiny by the supervisor for clarity and relevance. Additionally, two experts in industrial relations and workforce development reviewed the instrument to ensure that it accurately reflects the objectives of the study. Their feedback led to refinements in question wording and content to better align with the realities of automation in manufacturing industries.

### **Reliability of the Instrument**

A pilot study was conducted by administering 20 copies of the questionnaire to manufacturing workers (not included in the main study). Their responses were subjected to Cronbach's Alpha reliability testing, yielding a coefficient of 0.85, indicating a high level of internal consistency. This suggests that the questionnaire reliably measures the impact of automation on workforce skills.

### **Method Data Collection**

With approval from relevant manufacturing firms and the project supervisor, the researcher personally administered the questionnaire to selected respondents in Edo State. Participants will

be briefed on the study's purpose and assured of confidentiality. Completed questionnaires will be collected immediately where feasible, while others will be retrieved later, ensuring a high response rate.

### **Method of Data Analysis**

Data collected will be analyzed using percentages, mean scores, and standard deviations. Percentages summarize demographic details, while mean scores and standard deviations help interpret the degree of agreement or disagreement with each survey item. Results are presented in tables and discussed in relation to the research questions, providing insights into how automation affects workforce skills in Edo State's manufacturing industries.

## **CHAPTER FOUR**

### **ANALYSIS OF DATA AND DISCUSSION OF FINDINGS**

This chapter presents the results of the study, analyzes the collected data, and discusses the findings in relation to the research objectives. The data were collected via a structured questionnaire and analyzed using statistical methods. Each table is followed by an interpretation of the results, focusing on how automation affects workforce skills in Edo State's manufacturing industries.

### **DATA PRESENTATION**

**Table 1: Gender**

| <b>Gender</b> | <b>Frequency</b> |
|---------------|------------------|
| Male          | 35               |
| Female        | 25               |
| <b>Total</b>  | <b>60</b>        |

The data in Table 1 show that 35 respondents were male while 25 were female. This distribution indicates a slight male majority among the workforce sampled.

**Table 2: Age**

| <b>Age Bracket</b> | <b>Frequency</b> |
|--------------------|------------------|
| Under 25           | 10               |
| 25–34              | 30               |
| 35–44              | 15               |
| 45 & above         | 5                |
| <b>Total</b>       | <b>60</b>        |

Table 2 reveals that 10 respondents are under 25, 30 respondents fall within 25–34, 15 are between 35–44, and 5 are 45 and above. The data suggest that a significant portion of the workforce is relatively young (25–34).

**Table 3: Job Position/Role**

| <b>Job Position</b> | <b>Frequency</b> |
|---------------------|------------------|
| Technician          | 25               |
| Engineer            | 30               |
| Supervisor          | 20               |
| Manager             | 15               |
| Others              | 10               |
| <b>Total</b>        | <b>100</b>       |

### Interpretation:

The table above shows the distribution of respondents based on their job roles. Engineers make up the highest proportion at 30%, followed by Technicians at 25%. Supervisors account for 20%, while Managers represent 15% of the respondents. The remaining 10% fall under other job categories. This distribution suggests that most of the workforce in the manufacturing industries in Edo State comprises technical and engineering personnel, reflecting the technical expertise required in an automated environment.

### Impact of Automation on Workforce Skills

#### Decision Rule for Mean Interpretation

- **Mean  $\geq 2.50$**  → Agree (Positive perception or sufficient skill)
- **Mean  $< 2.50$**  → Disagree (Negative perception or insufficient skill)

### Presentation of Results

**Table 4: The specific effects of automation on workforce skills in Edo State's manufacturing industries**

| S/N | Item Statements                                                                                             | Mean (X) | Std. Dev. (SD) | Decision |
|-----|-------------------------------------------------------------------------------------------------------------|----------|----------------|----------|
| 1   | Automation has significantly increased the demand for specialized technical skills in my workplace.         | 2.70     | 0.95           | Agree    |
| 2   | The introduction of automated processes has reduced the need for manual or repetitive tasks in my job role. | 2.58     | 1.02           | Agree    |
| 3   | Learning to operate and maintain automated systems has become a core part of my work responsibilities.      | 2.45     | 1.10           | Disagree |
| 4   | Overall, automation has led to a higher level of productivity in my organization.                           | 2.80     | 0.88           | Agree    |
| 5   | I believe continuous learning is essential to keep up with evolving automation technologies.                | 3.10     | 0.74           | Agree    |

### Interpretation

- Item 1 (Mean = 2.70, SD = 0.95): A strong agreement indicates that respondents recognize automation's role in increasing demand for specialized skills like programming, troubleshooting, and data analysis.
- Item 2 (Mean = 2.58, SD = 1.02): Agreement suggests that many routine or repetitive tasks are being minimized or replaced by automated systems.
- Item 3 (Mean = 2.45, SD = 1.10): This below-threshold mean implies that respondents do not uniformly see operating and maintaining automated systems as a core responsibility—perhaps due to limited training or departmental segmentation of roles.
- Item 4 (Mean = 2.80, SD = 0.88): Indicates that respondents generally perceive a boost in productivity due to automation, highlighting potential operational efficiencies.
- Item 5 (Mean = 3.10, SD = 0.74): A strong consensus that continuous learning is vital, underscoring the workforce's acknowledgment that staying current with technology is key to remaining employable and effective.

**Table 5: Automation technologies Reshaping traditional labor roles in key manufacturing locations such as Benin City, Ekpoma, and Auchi.**

| S/N | Item Statements                                                                                         | Mean<br>(X) | Std.<br>Dev.<br>(SD) | Decision |
|-----|---------------------------------------------------------------------------------------------------------|-------------|----------------------|----------|
| 6   | I actively seek opportunities (e.g., training, online courses) to improve my automation-related skills. | 2.20        | 0.96                 | Disagree |
| 7   | My colleagues generally embrace new automated systems and are willing to learn.                         | 2.15        | 1.01                 | Disagree |
| 8   | The management in my organization encourages collaboration between workers and automated processes.     | 2.55        | 0.87                 | Agree    |

|                |                                                                                                                       |      |      |          |
|----------------|-----------------------------------------------------------------------------------------------------------------------|------|------|----------|
| 9              | I feel confident in my ability to adapt to emerging technologies in my field.                                         | 2.38 | 0.93 | Disagree |
| 10             | Most employees in my organization have successfully transitioned to roles requiring higher-level technical expertise. | 2.62 | 0.85 | Agree    |
| <b>Cluster</b> |                                                                                                                       | 2.38 | 0.92 |          |

### Interpretation

- Items 6 (2.20) & 7 (2.15): Both disagree, suggesting that workers do not frequently pursue external learning opportunities or that colleagues are hesitant to embrace new systems. This may point to cultural or resource-related barriers.
- Item 8 (2.55): Agreement here indicates management supports collaboration between workers and automation, implying that leadership recognizes the importance of human-machine synergy.
- Item 9 (2.38): Below 2.50, indicating respondents generally lack confidence in adapting to new technologies—perhaps due to insufficient training or limited hands-on experience.
- Item 10 (2.62): Shows agreement that many employees have transitioned to higher-skilled roles, reflecting how automation can create advanced positions but also underscores the need for continuous skill enhancement.

**Table 6: The extent to which workers in Edo State’s manufacturing sector adapting to the growing demand for technical skills brought about by automation.**

| S/N | Item Statements | Mean<br>(X) | Std.<br>Dev.<br>(SD) | Decision |
|-----|-----------------|-------------|----------------------|----------|
|-----|-----------------|-------------|----------------------|----------|

|    |                                                                                                                   |      |      |          |
|----|-------------------------------------------------------------------------------------------------------------------|------|------|----------|
| 11 | My organization provides regular training programs focused on automation and related technologies.                | 2.85 | 1.00 | Agree    |
| 12 | The training sessions offered are relevant to the practical skills needed for operating automated systems.        | 2.68 | 1.06 | Agree    |
| 13 | I receive ongoing mentorship or support from supervisors to handle new automated processes.                       | 2.72 | 0.89 | Agree    |
| 14 | The training programs I have attended so far have significantly improved my job performance.                      | 2.45 | 1.11 | Disagree |
| 15 | I believe the government and industries in Edo State should collaborate more to offer better automation training. | 2.60 | 0.95 | Agree    |
|    | <b>Cluster</b>                                                                                                    | 2.66 | 1.00 |          |

### Interpretation

- Items 11 (2.85), 12 (2.68), and 13 (2.72): Above 2.50, indicating that many respondents find existing training programs and mentorship helpful. This suggests some organizations are proactive in skill development.
- Item 14 (2.45): Below 2.50, meaning respondents do not uniformly perceive their current training programs as translating into improved performance—indicating potential gaps in quality or applicability.
- Item 15 (2.60): Reflects a belief that stronger collaboration between government and industry could enhance the effectiveness of automation-related training. This underscores a call for more integrated policies and partnerships.

**Table 7: Effectiveness of current training and capacity-building programs in preparing workers for automation technologies in Edo State.**

| S/N | Item Statements | Mean (X) | Std. Dev. (SD) | Decision |
|-----|-----------------|----------|----------------|----------|
|-----|-----------------|----------|----------------|----------|

|    |                                                                                                     |      |      |       |
|----|-----------------------------------------------------------------------------------------------------|------|------|-------|
| 16 | I am concerned that automation may eventually replace my current job role.                          | 3.05 | 0.78 | Agree |
| 17 | The adoption of automation has created new roles and opportunities in my organization.              | 3.10 | 0.82 | Agree |
| 18 | My company has a clear plan to address potential job displacement due to automation.                | 2.95 | 0.84 | Agree |
| 19 | Workers who acquire advanced technical skills are more secure in their positions.                   | 3.12 | 0.71 | Agree |
| 20 | Automation has positively influenced overall employment trends in Edo State's manufacturing sector. | 2.90 | 0.88 | Agree |
|    | <b>Cluster</b>                                                                                      | 3.02 | 0.81 |       |

### Interpretation

- Item 16 (3.05): Respondents generally agree they are concerned about job displacement, reflecting the dual nature of automation—opportunity vs. threat.
- Item 17 (3.10): Strong agreement indicates that many see automation as also creating new, often higher-skilled roles, reinforcing the concept of skill evolution.
- Item 18 (2.95): Agreement suggests that some organizations have strategies in place to mitigate displacement, possibly through retraining or role redefinition.
- Item 19 (3.12): Indicates a clear belief that advanced technical skills offer job security, emphasizing the importance of continuous learning.
- Item 20 (2.90): Positive influence on employment trends suggests that while certain jobs may be phased out, automation can also stimulate industry growth, leading to net positive outcomes if managed effectively.

### Discussion of Findings

#### Current Level of Automation and Workforce Skills

Tables 4 and 5 reveal a rising demand for specialized skills. However, some workers lack confidence or feel they have insufficient training. This highlights a gap between the speed of technological change and the workforce's readiness.

### **Challenges in Implementing Automation**

Although certain organizations provide regular training (Table 6), inadequate quality or low practical impact (Item 14) remains an issue. Concerns about job displacement (Item 16) coexist with recognition of new opportunities (Item 17). This duality underscores the need for clear organizational plans (Item 18) to address workforce transitions.

### **Proposed Solutions**

Respondents advocate for stronger government-industry collaboration (Item 15) and advanced technical skills (Item 19) to secure positions. Positive overall employment trends (Item 20) suggest that, with the right policies and training, automation could yield long-term benefits for Edo State's manufacturing sector.

### **Summary**

The analysis shows that automation is reshaping both skill requirements and job roles in Edo State's manufacturing sector. While many workers see the importance of continuous learning and recognize the productivity benefits of automation, challenges such as inadequate training and fear of displacement persist. Addressing these issues through comprehensive training programs, collaborative policies, and ongoing skill development will be critical for ensuring that automation serves as a catalyst for growth and innovation rather than a source of widespread disruption.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION, AND RECOMMENDATIONS**

This chapter presents a summary of the research questions that guided the study, the procedures used to derive the major findings, conclusions drawn from these findings, and recommendations for stakeholders. It concludes with suggestions for further research. The study explored how automation affects workforce skills in Edo State's manufacturing industries, examining the current level of automation, its impact on labor roles, the extent of workers' adaptation, and the effectiveness of training programs.

#### **Summary**

The purpose of this study was to assess the impact of automation on workforce skills in manufacturing industries within Edo State. A descriptive survey research design was employed, and data were gathered through a structured questionnaire administered to a sample of 60 respondents, comprising workers and managers in key manufacturing locations such as Benin City, Ekpoma, and Auchi. The instrument was validated by the researcher's supervisor and two experts in the field of industrial workforce development. Data were analyzed using mean and standard deviation, with a decision rule set at Mean  $\geq 2.50$  (Agree) or Mean  $< 2.50$  (Disagree).

In order to efficiently carry out this research work five (5) research questions were raised to guide the study. Based on the analysis data the following findings were made:

1. What are the specific effects of automation on workforce skills in Edo State's manufacturing industries?

2. How have automation technologies reshaped traditional labor roles in key manufacturing locations such as Benin City, Ekpoma, and Auchi?
3. To what extent are workers in Edo State's manufacturing sector adapting to the growing demand for technical skills introduced by automation?
4. How effective are current training and capacity-building programs in preparing workers for automation technologies in Edo State?

## **Conclusion**

Based on the study's findings, automation significantly influences workforce skills in Edo State's manufacturing industries, creating both opportunities and challenges. Workers who proactively seek to upgrade their technical abilities tend to adapt more smoothly, while those with limited training resources face the risk of job displacement. Although many respondents recognize the benefits of automation such as increased productivity and new job roles concerns remain about inadequate funding, insufficient equipment, and weak collaboration among key stakeholders. Addressing these issues through systematic upskilling programs, modernized training facilities, and strategic partnerships can ensure that automation becomes a catalyst for industrial growth rather than a source of workforce displacement.

## **Recommendation**

To address the challenges identified in this study, it is recommended that manufacturing industries in Edo State take proactive steps toward workforce development in the age of automation. One crucial step is revising training programs to incorporate modern technological skills such as robotics, artificial intelligence, and data analytics. Many workers struggle to adapt to automation because traditional training curricula are outdated and fail to address current industry demands. By redesigning these programs, industries can ensure that workers are equipped with practical knowledge that aligns with technological advancements.

Another important recommendation is the provision of upgraded workshop facilities and equipment. Many technical institutions and training centers in Edo State lack access to modern

automation tools, making it difficult for workers to gain hands-on experience. Industries and educational institutions must collaborate to provide access to cutting-edge machinery and simulation tools, ensuring that employees are adequately prepared for real-world applications. Practical exposure to automation technologies will not only boost workers' confidence but also enhance their efficiency in handling automated processes.

Additionally, there is a need for regular training and re-skilling programs for both employees and instructors. Manufacturing firms should organize periodic workshops, seminars, and certification courses that enable workers to stay updated on emerging automation trends. Supervisors and managers should also undergo specialized training to effectively guide their teams in adapting to new technologies. Investing in continuous professional development will ensure that employees remain relevant and competitive in an increasingly automated environment.

Furthermore, the government should play an active role in supporting workforce development initiatives by providing financial assistance and policy support. Many industries struggle with automation training due to financial constraints, making it necessary for the government to offer grants, tax incentives, or subsidies to organizations that invest in workforce training. Public-private partnerships should be encouraged to facilitate the sharing of resources and expertise, ensuring that both industries and workers benefit from structured automation training programs.

Finally, research and innovation should be encouraged to bridge the knowledge gap on automation trends. Manufacturing industries should collaborate with research institutions to conduct studies on the impact of automation on workforce skills, identifying areas that require improvement. Findings from such research should be used to develop policies and strategies that align workforce training with technological advancements. Encouraging a research-driven approach to workforce development will help industries anticipate future trends and prepare their employees accordingly.

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## **APPENDIX A**

### **FACULTY OF EDUCATION**

#### **DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION**

#### **UNIVERSITY OF BENIN, BENIN CITY**

### **QUESTIONNAIRE**

**Dear Respondent(s),**

My name is **Julius Ifechukwu OSSAI** with matriculation number **EDU2006125**, I am a final-year student of the above-named Department, conducting a research study on the **“The Impact of Automation on Workforce Skills in Manufacturing Industries in Edo State.”** This research work is solely for academic purpose and all your responses will be treated with confidentiality. Kindly respond to the questions by ticking (✓) the appropriate option.

Thank you for your usual cooperation.

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**(Researcher)**

## APPENDIX B

### SECTION A: DEMOGRAPHIC DATA

**Gender:** Male ( ) Female ( )

**Age:** 18 – 25, ( ) 26 – 35, ( ) 36 – 45, ( ) 46 and above ( )

**Job Position/Role:** Machine Operator, ( ) Technician, ( ) Engineer, ( ) Supervisor/Manager, ( )

### SECTION B:

Please read each statement carefully. Indicate your level of agreement by ticking (✓) the appropriate box using the following scale:

#### KEY:

- SA = Strongly Agree = 4
- A = Agree = 3
- D = Disagree = 2
- SD = Strongly Disagree = 1

| S/N | Item Statement                                                                                                  | SA<br>(4) | A<br>(3) | D<br>(2) | SD<br>(1) |
|-----|-----------------------------------------------------------------------------------------------------------------|-----------|----------|----------|-----------|
| RQ1 | <b>What are the specific effects of automation on workforce skills in Edo State's manufacturing industries?</b> |           |          |          |           |
| 1   | Automation has significantly increased the demand for specialized technical skills in my workplace.             |           |          |          |           |
| 2   | The introduction of automated processes has reduced the need for manual or repetitive tasks in my job role.     |           |          |          |           |

|            |                                                                                                                                                        |  |  |  |  |
|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| 3          | Learning to operate and maintain automated systems has become a core part of my work responsibilities.                                                 |  |  |  |  |
| 4          | Overall, automation has led to a higher level of productivity in my organization.                                                                      |  |  |  |  |
| 5          | I believe continuous learning is essential to keep up with evolving automation technologies.                                                           |  |  |  |  |
| <b>RQ2</b> | <b>How have automation technologies reshaped traditional labor roles in key manufacturing locations such as Benin City, Ekpoma, and Auchi?</b>         |  |  |  |  |
| 6          | I actively seek opportunities (e.g., training, online courses) to improve my automation-related skills.                                                |  |  |  |  |
| 7          | My colleagues generally embrace new automated systems and are willing to learn.                                                                        |  |  |  |  |
| 8          | The management in my organization encourages collaboration between workers and automated processes.                                                    |  |  |  |  |
| 9          | I feel confident in my ability to adapt to emerging technologies in my field.                                                                          |  |  |  |  |
| 10         | Most employees in my organization have successfully transitioned to roles requiring higher-level technical expertise.                                  |  |  |  |  |
| <b>RQ3</b> | <b>To what extent are workers in Edo State's manufacturing sector adapting to the growing demand for technical skills brought about by automation?</b> |  |  |  |  |
| 11         | My organization provides regular training programs focused on automation and related technologies.                                                     |  |  |  |  |
| 12         | The training sessions offered are relevant to the practical skills needed for operating automated systems.                                             |  |  |  |  |
| 13         | I receive ongoing mentorship or support from supervisors to handle new automated processes.                                                            |  |  |  |  |
| 14         | The training programs I have attended so far have significantly improved my job performance.                                                           |  |  |  |  |
| 15         | I believe the government and industries in Edo State should collaborate more to offer better automation training.                                      |  |  |  |  |
| <b>RQ4</b> | <b>How effective are current training and capacity-building programs in preparing workers for automation technologies in Edo State?</b>                |  |  |  |  |
| 16         | I am concerned that automation may eventually replace my current job role.                                                                             |  |  |  |  |
| 17         | The adoption of automation has created new roles and opportunities in my organization.                                                                 |  |  |  |  |
| 18         | My company has a clear plan to address potential job displacement due to automation.                                                                   |  |  |  |  |

|    |                                                                                                     |  |  |  |  |
|----|-----------------------------------------------------------------------------------------------------|--|--|--|--|
| 19 | Workers who acquire advanced technical skills are more secure in their positions.                   |  |  |  |  |
| 20 | Automation has positively influenced overall employment trends in Edo State's manufacturing sector. |  |  |  |  |