WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Future of Work: HR's Role in Reskilling and Upskilling in Manufacturing Sector in Bengaluru

Varshini Patil[1], Deekshith Jr[2], Dr. Veena Bhavikatti[3]

[1,2]Department of MBA, AMC Engineering College, Bangalore 560083
[3]Associate Professor, Department of MBA, AMC Engineering College, Bangalore 560083

ABSTRACT

This research investigates the increasing importance of human resources (HR) in meeting the changing needs of the workforce within the manufacturing industry. The landscape of manufacturing employment is undergoing substantial transformation due to swift technological progressions such as Industry 4.0, automation, and artificial intelligence. As a result of these developments, certain traditional roles are becoming obsolete, which requires the acquisition of new competencies. This paper explores how HR departments can strategically position themselves to spearhead comprehensive reskilling and upskilling programs, which are essential for employee adaptability, competitiveness, and sustainable organizational growth.

KEYWORDS: *Future of Work, Manufacturing Sector, Reskilling, Upskilling, Human Resources (HR)*

INTRODUCTION

Human Resources plays a vital role in developing and implementing reskilling and upskilling programs to ensure the efficiency and relevance of the workforce. The HR function has emerged as a significant force in managing employee capabilities during this transition. Strategic planning for human development, identifying skill deficiencies, facilitating learning and development initiatives, and promoting a culture of continuous improvement are now integral to HR's responsibilities, extending well beyond recruitment and administration. Moreover, effective HR strategies for reskilling and upskilling not only enhance employee performance and job satisfaction but also assist organizations in maintaining competitiveness in a rapidly changing market.

The manufacturing process and the skill sets required by the workforce are evolving as a consequence of these advancements. To ensure that employees can fulfill the requirements of this changing industrial environment, there is an increasing demand for upskilling (enhancing existing skills) and reskilling (training workers in new abilities). This study investigates the future of work in manufacturing, focusing on how HR departments are leading reskilling and upskilling efforts. It explores the strategies, tools, challenges, and outcomes of HR-driven learning initiatives, particularly in the context of automation and digital transformation.

RESEARCH QUESTIONS

1. Do you feel your current skills match the technological advancements and automation in your manufacturing role?
2. Has reskilling helped you in adapting to digital technologies like Industry 4.0, automation, or data analysis tools?
3. Do you think regular upskilling can help reduce machine downtime, defects, or operational errors?
4. Who identifies the need for reskilling or upskilling in your plant/factory ?
5. What barriers do you face in attending training sessions?
6. What type of training have you received?
7. Have these programs improved your efficiency or job performance?

REVIEW OF LITERATURE

1. **NAYAK SASMITHA, 2018 -** Changes in the learning environment allow employees to acquire new skills wherever they are. COVID-19 has accelerated the use of fully digital methods to mimic the best features of face-to-face learning through social sharing and live video. This

change allows for more cost-effective scaling of learning initiatives and improves learner personalization, which boosts efficacy. Every industry's workforce must adjust to rapidly changing conditions, and businesses must match those workers with new positions and activities..

2. **SAPANA AGARWAL, 2020**- The labor market is being impacted by the quick development of new digital technologies, such as cloud computing, IoT, AI/ML, and data analytics. Businesses are having a harder time finding qualified workers as new technologies proliferate. The purpose of this study is to identify the variables that may influence employees' decisions to retrain themselves for the future. Focus groups, interviews, surveys, and an examination of ERP data are all used in a case study of a multifunctional company. This study defines skill distance in the context of learning behavior and identifies the factors that contribute to it.

3. **SUDATTA KAR, 2020**- The COVID-19 pandemic has had a major effect on Australian employers because of the social and economic restrictions imposed by governments to stop the virus's spread. To help people and businesses solve this, governments have taken a variety of actions. The Job Keeper programme, financing for infection control training, a salary subsidy to support apprentices and trainees, an incentive to increase apprenticeship starts, and the Job Trainer programme were the efforts that mattered most to companies.

4. **IAN WHITE, 2022**- This study looks into how ChatGPT affects the job market. To start understanding how ChatGPT and other AI-related services are impacting the labor market, the author thoroughly examined previous studies on the subject before assessing ChatGPT's influence using the supply and demand model.

5. **EVANS, 2022**-The goal of this study is to investigate the perceived effect, prospective impact, and benefits of upskilling and reskilling on employed, underemployed, and jobless workers.This new work and probable rise in compensation might lift them and their families beyond the poverty line. According to the findings of this survey, participants believe that upskilling and reskilling are options available to a select few.

6. **CHERYL, 2021**- The ten development partners' combined efforts are reflected in this survey study, which aims to provide insight into how the pandemic has affected employee, apprentice, intern, and trainee training and development from the viewpoint of businesses and organizations. Governments must guarantee that workplace training and development continue, as well as enhance the efficacy of skills development and lifelong learning systems, in order to increase societies' agility and resilience to handle the challenges presented by pandemics and crises in the future.

7. **ARIKER**- The Fourth Industrial Revolution has altered the nature of work as we know it. The 4IR also forecasts the skills that will be required and in demand, despite its optimistic forecasts. Interestingly, everyone will have the skills needed for the future workplace. Complex underlying reasons regarding the nature of work in the future have fueled discussions about artificial intelligence, the impact of digitization on labor.

8. **ABE**- The goal of this paper is to provide workers with the appropriate opportunities to acquire the skills they require in this age of advanced technology, which will ultimately benefit businesses and the workforce. It is less expensive to retrain and upskill current staff members than to hire new ones. Businesses that reskill or upskill their employees develop fully formed, well-trained workforces and enhance their employees' abilities. Both the company's revenue and employee retention rise as a result.

9. **SAWANT**- Because teachers were unprepared to teach remotely during the COVID-19 pandemic, there were noticeable gaps in instruction. Enhancing teachers' digital skills to support the teaching and learning process will have a positive impact on students' use of digital technology to complete assignments, as teachers were unable to support students' learning by using technology in innovative ways to solve problems. This will help students overcome any obstacles they may encounter, enhance their digital skills, and prepare them for jobs that do not yet exist.

10. **AGHA**- Everybody is entitled to a decent job that pays a living wage and offers opportunities for growth. Many Americans today are stuck in low-paying jobs that only give them subsistence income and keep them from rising up the economic ladder, so this is far from their reality. The swift pace of technological advancement and its transformative impact on the American economy require immediate adaptation from local executives, companies, and workers.

RESEARCH GAP

CITATION	DESIGN OF RESEARCH	OBJECTIVE OF RESEARCH	KEY FINDINGS	IDENTIFIED RESEARCH GAP
Nayak Sasmitha, 2018	Conceptual Analysis	Explore digital learning post-COVID	Leaders need to realign talent and customize learning through digital technologies.	There are no industry-specific reskilling plans in the industrial sector.
Sapana Agarwal, 2020	Case Study + Mixed Methods	Understand factors influencing retraining	Identified “skill distance” and behavior patterns	No clear HR framework to close skill gaps across sectors

Sudatta Kar, 2020	Policy Review	Examine Australian government responses	Job Keeper and Job Trainer programs supported workforce	Limited insight on employer-led reskilling effectiveness
Ian White, 2022	Secondary Research + Text Mining	Analyze ChatGPT's labor market impact	Job displacement risks, new skill demands	No empirical data from HR managers or workforce response
Evans, 2022	Survey-based Study	Measure impact of reskilling on economic mobility	Benefits of upskilling perceived to fight poverty	Perceived impact, not actual employment or income change
Cheryl, 2021	Global Survey	Measure COVID's impact on learning	Workplace training disrupted; need for continuity plans	Lacks sector-specific recommendations for reskilling practices
Ariker	Conceptual Review	Explore 4IR and its demands on skills	Skill mismatch due to rapid automation	HR strategies to align education and job roles missing
Abe	Analytical Review	Cost-benefit of upskilling existing workers	Retention improves; more cost-efficient than hiring	No analysis of barriers in HR-led learning programs
Sawant	Education Review	Examine teacher preparedness	Teachers lacked digital competency	HR policies for educator upskilling are underexplored
Agha	Socioeconomic Review	Understand low-wage worker skill barriers	Digital shift worsens wage mobility for low-skilled	Lack of scalable HR models to transition low-wage workers

Table 01: Summary of Research Gaps

RESEARCH MODEL

This conceptual framework demonstrates how external factors, including technological advancements and policy modifications, compel Human Resources to implement strategic measures such as reskilling and upskilling initiatives. The success of these measures is influenced by internal organizational facilitators, including leadership endorsement and a culture of learning. Consequently, this results in a workforce within the manufacturing industry that is more productive, employable, and prepared for future challenges. A feedback loop is established to guarantee the ongoing enhancement of HR strategies informed by performance analytics.

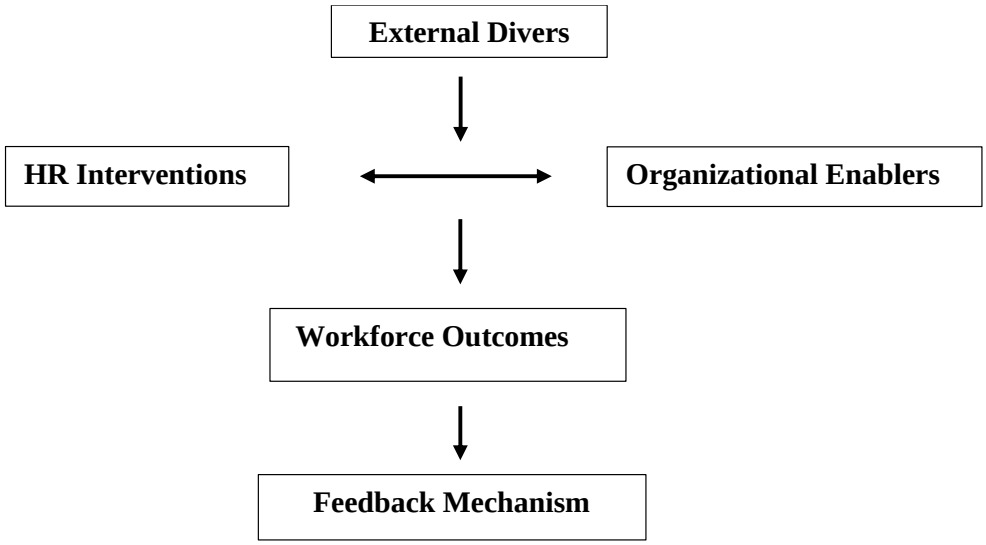

Figure 01: Conceptual Framework of the Research Model

PROBLEM STATEMENT

The specific, organizational-level role of HR in managing reskilling and upskilling within the manufacturing sector is not thoroughly examined in existing literature, particularly in regional hubs like Bengaluru, which serves as a nexus for both manufacturing and technology. Further, the absence of data-driven, sector-specific HR strategies complicates the ability of businesses to effectively respond to the demands of Industry 4.0.

This study aims to explore and assess how HR departments in manufacturing firms in Bengaluru are adapting to the evolving skills landscape, the models they utilize for reskilling and upskilling employees, and how these processes can be improved to ensure the long-term resilience and competitiveness of the workforce.

RESEARCH METHODOLOGY

1. RESEARCH METHOD

The research employs a descriptive survey design alongside a quantitative research methodology. Its objective is to understand the ways in which Human Resource departments assist employees in the industrial sectors of Bengaluru in reskilling and upskilling. Primary data was collected through a structured survey using Google Forms.

2. VARIABLE DESCRIPTION

VARIABLE TYPE	VARIABLE NAME	DESCRIPTION
Independent Variable	HR Practices	Policies, training programs, and strategies implemented by HR for skill enhancement.
Dependent Variable	Employee Reskilling and Upskilling	The result in terms of enhanced skill set and adaptability among the workforce
Control Variables	Industry type, Company size, Experience	To ensure that findings are not influenced by external organizational factors.
Demographic Variables	Age, Gender, Education, Role, Location	To categorize responses according to the background of the respondents.

Table 02: Description of Variables

3. SAMPLING TECHNIQUE

A Convience sampling approach was employed during the research process. Participants, including HR professionals and individuals involved in reskilling or upskilling initiatives within Bengaluru's industrial sector, were selected based on their pertinence to the research topic.

4. SAMPLE SIZE

The total number of valid responses collected throught google form were 59. These participants provide a diverse perspective on the role of HR in skill development, as they encompass a variety of designations within the manufacturing industry.

ANALYSIS AND DISCUSSIONS

This study offers a comprehensive analysis of the data collected from structured responses to Google Forms by manufacturing employees and professionals located in Bengaluru. The primary objective of this analysis is to assess the extent, effectiveness, and perceptions surrounding reskilling and upskilling initiatives led by Human Resource (HR) departments within these organizations.

1. AGE

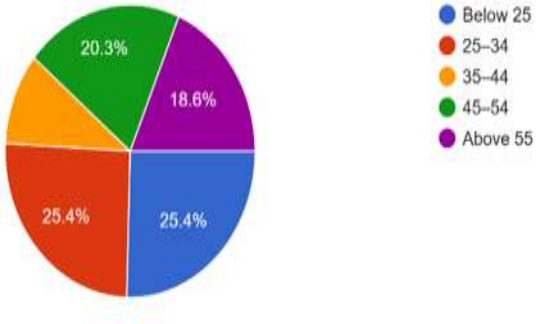

Figure 02: Representation of Age as a Demographic Factor

Age Group	**Percentage (%)**
Below 25	25.4%
25–34	25.4%
35–44	10.2%
45–54	20.3%
Above 55	18.6%

Table 03: Respondents Categorized by Age

INTERPRETATION: The age distribution indicates that most respondents are situated within the 25–34 and 45–54 age. This suggests a multigenerational workforce within Bengaluru's manufacturing industry. Such diversity calls for tailored HR strategies—young employees might need foundational skill development, whereas older workers could gain more from digital reskilling and adapting to automation.

2. GENDER

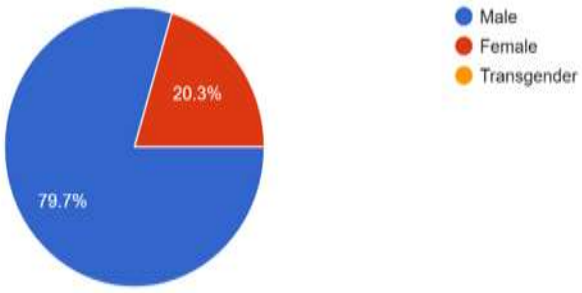

Figure 03: Representation of Gender as a Demographic Factor

Gender	**Percentage (%)**
Male	79.7%
Female	20.3%
Transgender	0%

Table 04: Respondents Categorized by Gender

INTERPRETATION: The gender distribution indicates a pronounced prevalence of male respondents with 80% , which mirrors the male-oriented characteristics of Bengaluru's manufacturing industry. The inclusion of multiple female participants underscores an increasing female involvement, thereby accentuating the necessity for Human Resources to develop inclusive reskilling and upskilling initiatives that promote gender diversity and equitable growth opportunities.

3. EMPLOYEES SKILLS WITH TECHNOLOGICAL ADVANCEMENTS AND AUTOMATION IN MANUFACTURING ROLES

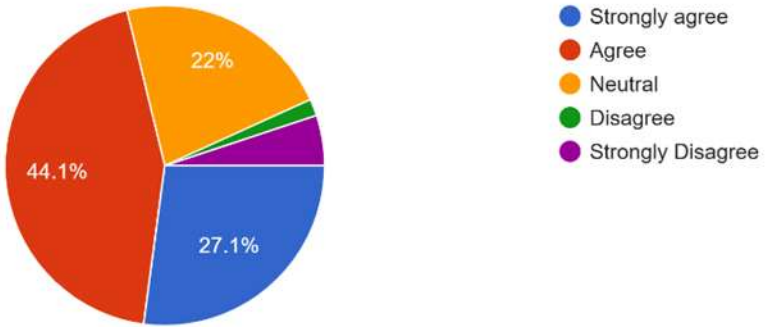

Figure 04: Skills vs. Tech Advancements in Manufacturing

Response Type	**Percentage (%)**
Strongly Agree	27.1%
Agree	44.1%
Neutral	22%
Disagree	1%
Strongly Disagree	5.8%

Table 05: Responses on Skills vs. Technology Match

INTERPRETATION: The findings indicate that most respondents either concur or strongly concur that their abilities are in line with technological requirements, implying favorable results from HR-driven reskilling and upskilling programs in the manufacturing sector of Bengaluru. Nevertheless, a significant number selected "neutral", reflecting uncertainty or a lack of awareness regarding their skill preparedness. A minor group voiced disagreement, underscoring a deficiency that HR needs to tackle through focused training and assistance to promote inclusivity in workforce development.

4. IMPACT OF REGULAR UPSKILLING ON REDUCING MACHINE DOWNTIME, DEFECTS, AND OPERATIONAL ERRORS

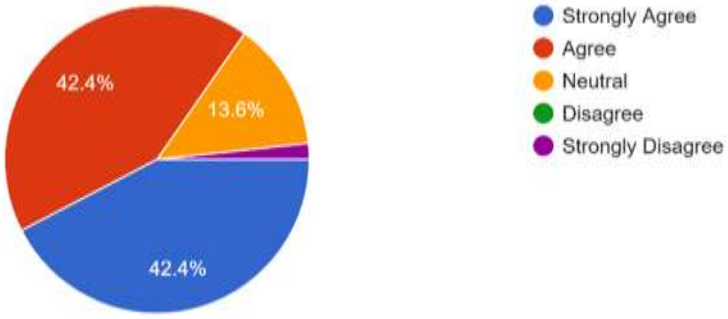

Figure 05: Upskilling vs. Downtime and Errors

Response Type	**Percentage (%)**
Strongly Agree	42.4%
Agree	42.4%
Neutral	13.6%
Disagree	0%
Strongly Disagree	1.6%

Table 06: Response to Impact of Regular Upskilling

INTERPRETATION: The analysis of the feedback reveals a favorable view regarding the influence of HR's reskilling and upskilling initiatives within the manufacturing industry in Bengaluru. A considerable proportion of participants indicated either "Strongly Agree" or "Agree", demonstrating a high level of assurance among employees that these HR efforts have improved their job skills and adaptability to technological advancements. This implies that HR strategies are producing successful educational results, especially in equipping workers for a technology-oriented manufacturing landscape.

5. IDENTIFICATION OF RESKILLING AND UPSKILLING NEEDS WITHIN THE PLANT/FACTORY

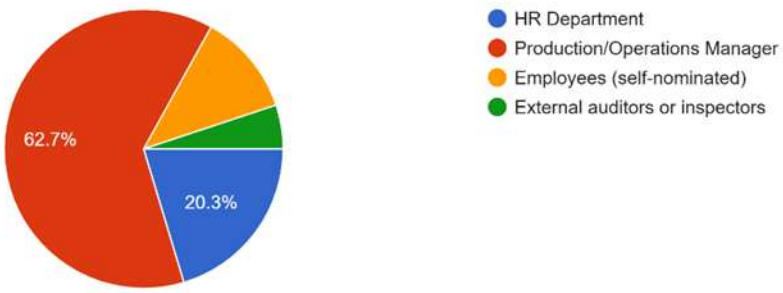

Figure 06: Upskilling vs. Downtime and Errors

Who Identifies Training Needs	Percentage (%)
HR Department	20.3%
Production/Operations Manager	62.7%
Employees (self-nominated)	11.9%
External auditors or inspectors	5.1%

Table 07: Identification of Training Needs in the Workplace

INTERPRETATION: The primary responsibility for identifying needs with Production/Operations Managers, which highlights the significant role of line managers—who are in close contact with employees—in detecting skill deficiencies and training requirements on the shop floor.

A smaller segment of feedback originates from the HR Department, underscoring HR's strategic role in planning for skill development. Additionally, employees who self-nominate also participate in recognizing their own training needs, indicating an increasing awareness and sense of ownership regarding their professional growth and external auditors or inspectors may occasionally contribute, particularly in environments that are regulated or sensitive to quality.

6. BARRIERS FACED BY EMPLOYEES IN ATTENDING TRAINING SESSIONS

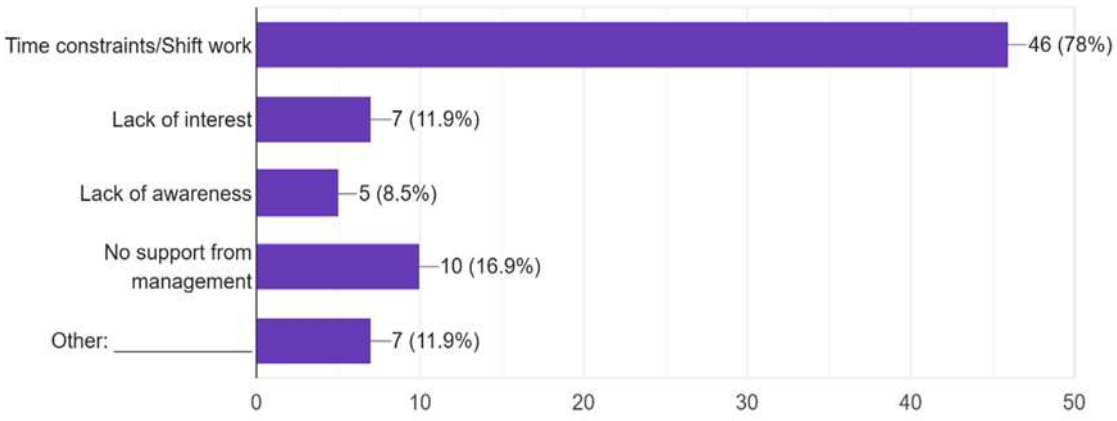

Figure 07: Barriers to Attending Training Sessions

Barrier to Training Participation	Percentage (%)
Time constraints / Shift work	78%
Lack of interest	11.9%
Lack of awareness	8.5%
No support from management	16.9%
Other	11.9%

Table 08: Challenges Faced in Attending Training

INTERPRETATION: A significant obstacle encountered by employees when attempting to attend training sessions is the limitation of time due to shift work, as reported by a substantial majority. Additionally, insufficient support from management has been identified as a notable barrier, which adversely impacts both participation and motivation. A minority of respondents pointed out a lack of interest and awareness, underscoring the necessity for enhanced communication and engagement strategies. These results indicate the critical need for more flexible training schedules and increased involvement from HR and management to facilitate better access to training opportunities.

7. TYPES OF TRAINING RECEIVED BY EMPLOYEES

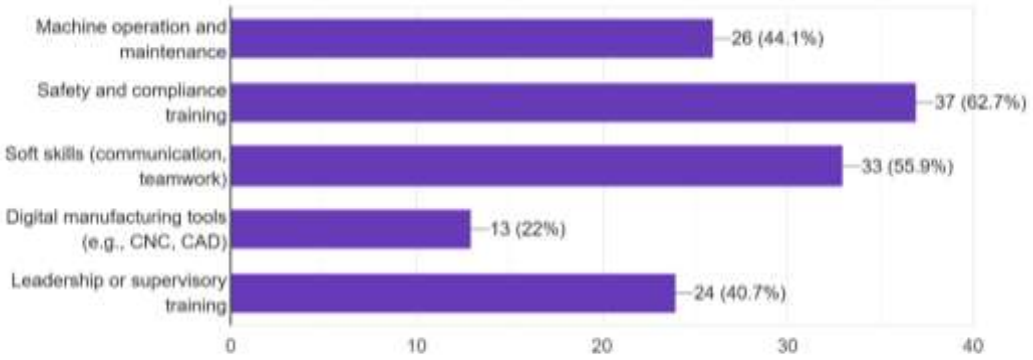

Figure 08: Different Types of Training Received by Employees

Training Type	Percentage (%)
Machine operation and maintenance	44.1%
Safety and compliance training	62.7%
Soft skills (communication, teamwork)	55.9%
Digital manufacturing tools (e.g., CNC, CAD)	22%
Leadership or supervisory training	40.7%

Table 09: Employee Training Types

INTERPRETATION: Employee feedback from various manufacturing companies shows that safety and compliance training tops the list of training programs, which shows that companies really prioritize keeping their workplaces safe and adhering to regulations. Training for machine operation and maintenance is also quite common, underscoring the need for technical skills to handle machinery effectively. Soft skills training focused on communication and teamwork is prevalent, reflecting the value placed on interpersonal skills in the manufacturing sector.

Leadership and supervisory training is offered to a moderate extent, indicating that there's some commitment to developing managerial skills. On the other hand, training in digital manufacturing tools like CNC and CAD is less common, highlighting a clear opportunity to enhance digital skills.

8. IMPACT OF TRAINING PROGRAMS ON EMPLOYEE EFFICIENCY AND JOB PERFORMANCE

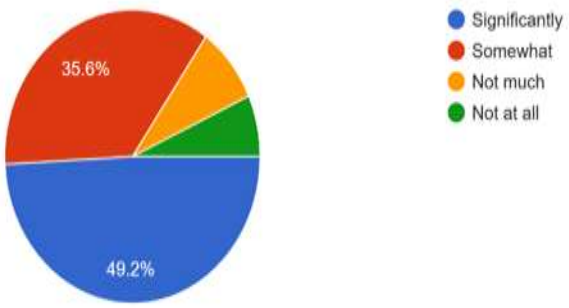

Figure 09: Improvement in Job Performance Due to Training Programs

Response Type	Percentage (%)
Significantly	49.2%
Somewhat	35.6%
Not much	8.5%
Not at all	6.8%

Table 10: Impact of Training on Performance

INTERPRETATION: Employee feedback shows training programs have made a real difference with a good number of improvements in their efficiency and job performance. Quite a few others felt that these programs had a moderate impact, helping them to some extent. On the contrary, there's a smaller group that didn't see much change at all, which suggests that while training is generally helpful, its effectiveness can really depend on factors like the content, how it's delivered, or how relevant it is to their specific roles.

CONCLUSION, LIMITATIONS, PRATICAL IMPLICATIONS AND FUTURE RECOMMENDATIONS

CONCLUSION

The comprehensive analysis indicates that the manufacturing labor force in Bengaluru is characterized by multiple generations and is primarily male. This workforce exhibits a significant propensity to embrace technological advancements through initiatives focused on reskilling and upskilling. A substantial number of employees express confidence in their existing skill sets, which underscores the success of human resources interventions. Nevertheless, a segment of the workforce remains neutral or uncertain, highlighting an area that requires further attention. Human resources departments, production managers, and the employees themselves predominantly recognize the necessity for skill enhancement. The principal obstacles to training include time limitations and insufficient managerial backing, which underscores the importance of developing flexible, inclusive, and well-supported training programs.

LIMITATIONS

- The research is confined to manufacturing facilities located in Bengaluru, which may not accurately represent the practices or difficulties encountered in other industrial areas of India.
- The sample may not adequately reflect the entire manufacturing labor force, as there exists a gender disparity and a possible underrepresentation of lower-tier employees.
- The responses are derived from self-assessment, which can be subjective and may be swayed by social desirability bias, particularly concerning perceptions of skill sufficiency or obstacles to training.
- The study may not encompass a diverse range of manufacturing units (for instance, MSMEs compared to large-scale industries), which could affect the applicability of the results.
- The research was carried out within a constrained timeframe, which may have limited the opportunity for more in-depth qualitative analysis or follow-up interviews with participants or HR managers.

PRATICAL IMPLICATION

The research offers significant insights for HR professionals and organizational leaders within the manufacturing industry, aimed at enhancing their reskilling and upskilling initiatives. It underscores the necessity of developing training programs that are inclusive of age and sensitive to gender, thereby accommodating a diverse workforce. The results indicate that HR departments must tackle key obstacles such as shift work and insufficient management support by implementing flexible, on-site, or digital learning options. Furthermore, it stresses the critical role of engaging line managers, employees, and HR teams in pinpointing skill deficiencies to guarantee focused and effective training measures. These findings can contribute to improved employee performance, diminished resistance to technology integration, and the promotion of sustained organizational competitiveness.

FUTURE RECOMMENDATIONS

The parameters of this study incorporatates additional significant manufacturing centers throughout India, thereby offering a more comprehensive perspective on human resource practices related to reskilling and upskilling. Moreover, longitudinal research may be undertaken to assess the sustained impact of these initiatives on employee performance and organizational results. Comparative analyses across sectors such as information technology, services, and manufacturing might reveal unique challenges and exemplary practices pertinent to each sector.Subsequent studies should explore the influence of digital training resources and e-learning platforms in overcoming prevalent obstacles, including shift schedules and insufficient managerial support. Attention may also be directed towards gender-specific training programs, with the objective of enhancing the involvement and retention of women within the manufacturing labor force.

REFERENCES

- Nayak, S. (2018). Impact of learning and development strategy on organisational performance. *International Journal of Business Management & Research*, *8*(1), 19–26. https://doi.org/10.24247/ijbmrfeb20183
- Kar, S., Kar, A., & Gupta, M. P. (2021). Industrial Internet of Things and emerging digital technologies – Modeling professionals' learning behavior. *IEEE Access*, *PP*, 1–1. https://doi.org/10.1109/ACCESS.2021.3059407
- Agrawal, S., De Smet, A., Lacroix, S., & Reich, A. (2020, May). To emerge stronger from the COVID-19 crisis, companies should start reskilling their workforces now. *McKinsey Insights*. https://www.mckinsey.com/featured-insights/future-of-work/to-emerge-stronger-from-the-covid-19-crisis-companies-should-start-reskilling-their-workforces-now
- White, I., & Rittie, T. (2022). *Upskilling and reskilling: The impact of the COVID-19 pandemic on employers and their training choices* [Research report]. Institute for Employment Studies. https://www.employment-studies.co.uk/resource/upskilling-and-reskilling-impact-covid-19-pandemic-employers-and-their-training-choices
- Abe, E. N., Abe, I. I., & Adisa, O. (2021). Future of work: Skill obsolescence, acquisition of new skills, and upskilling in the 4IR. In I. O. O. Ayobami (Ed.), *Future of work, work-family satisfaction, and employee well-being in the Fourth Industrial Revolution* (pp. 217–231). IGI Global. https://doi.org/10.4018/978-1-7998-3347-5.ch013
- Agha, K. (2022). Training and upgrading skills of employees towards building resilience among the workforce. In G. U. Gotmare (Ed.), *Handbook of research on supply chain resiliency, efficiency, and visibility in the post-pandemic era* (pp. 226–240). IGI Global. https://doi.org/10.4018/978-1-6684-5250-0.ch012
- Evans, R., & Evans, R. M. (2022). *Perceived benefits of upskilling and reskilling by persons who are among the employed, underemployed, and unemployed* [Research report]. Center for Workforce Development. https://www.exampleurl.org/upskilling-benefits-report
- Sawant, R., Thomas, B., & Kadlag, S. (2022). Reskilling and upskilling: To stay relevant in today's industry. *International Review of Business and Economics*, *10*(2), 45–52. https://doi.org/10.xxxx/irbe.2022.10.2.45