



Gender Disparities and Challenges in Manufacturing Workplaces: A Comprehensive Analysis of Neoliberal Policies and Workplace Inequities

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Abstract

Gender-based disparities and systemic challenges faced by workers, particularly women, in manufacturing industries under the influence of neoliberal policies, and technological advancements. Drawing on survey data from 318 respondents across Tamil Nadu's manufacturing sector, the analysis highlights issues such as job insecurity, inequitable workplace policies, limited ergonomic support, and barriers to career progression. Statistical findings reveal that women struggle more with balancing caregiving responsibilities and adapting to temporary employment, exacerbated by deregulation and outsourcing. Despite increased representation in managerial roles, systemic biases and informal networks continue to hinder women's advancement and perpetuate wage gaps. The study also explores the ergonomic and scheduling challenges faced by women, emphasizing how these issues contribute to workplace discomfort, reduced productivity, and limited retention. It underscores the need for gender-sensitive reforms, including equitable scheduling, robust training programs, and parity in benefits across employment types. Addressing these systemic inequities is essential to fostering inclusivity and ensuring sustainable economic growth. By highlighting the intersection of economic efficiency and social justice, this research provides actionable insights into creating equitable manufacturing workplaces that empower all genders to thrive.

Keywords: Gender disparities, neoliberal policies, manufacturing industries, workplace inequality, job security, ergonomic challenges, and workforce inclusivity.

Introduction

Industrial workers are the backbone of world economic development, playing an essential role in the growth and success of industries worldwide. Their labour and dedication power the entire production process, from manufacturing to quality control and distribution. As labour historian E.P. Thompson stated, "The working class made itself as much as it was made." highlighting how these workers not only drive the industries they serve but also contribute significantly to shaping the broader economy (E. P. Thompson, 2013). Their efforts generate goods, spur innovation, and propel technological advancements, making them indispensable to industrial and economic progress. But due to the widespread neoliberal policies industrial labourers are facing social discrimination and exclusion, gender inequality in their workspace. Weber already talks about this in the name of process of rationalization and the spread of bureaucracy could lead to "iron cage" a situation where individuals are trapped in systems of efficiency and control, unable to exercise personal freedom or creativity. In such a system, workers find themselves constrained by rules, regulations, and roles that they cannot escape, even if these rules do not serve their personal interests or the broader societal good (Sung Ho Kim, 2022). In this research article analysis the neoliberal policies on manufacture industries and how these changes generate new sources of pain, suffering and inequities in the workplace. The



manufacture industry has a global economic footprint. This is true in terms of its direct (production, distribution, sales) and indirect (support to via finance, repairs, etc.) contribution to the national economy as a percentage of Gross Domestic Product or total output. Moreover, the manufacture industry has significant external effects as a driver for employment and income growth. It is also a determinate factor in GDP growth and wealth creation since value generated increases as money passes from one hand to another through the production and service sector. Indeed, the automobile manufacturing value added in the gross domestic product grew from 2.85 billion in 2005 to 3.66 billion in 2015, which represents a 9% increase in the global automotive industry (Adam Cooper et al., 2015). Small and new economies, particularly former Soviet bloc and East European countries, see the automotive industry as a key driver of future economic growth. It is believed that cars and trucks manufactured through the efforts of manufacturers have been the backbone of our economy, and freight railroads have been essential to it, whereas it is argued that: "Over the past half century, no other industry has made a more significant investment in capital than automakers and their supplier partners (Vozmilova et al., 2016). This capital offers the largest and perhaps the most influential economic mega multiplier effect on our economy, providing more employment and economic opportunities than any other sector." Such emphasis also reflects an increasing trend toward regional development strategies based on road and urban infrastructure. Such orientation emphasizes growth and economic development and is also in line with the trends indicated by economic geography regarding regional growth and attraction of productive factors, particularly the results of studies (Pavlínek et al., 2017). Hence, while manufacturers are moving to urban areas, existing cities are often enhanced as the pattern of production networks is dictated by the kind and the level of the resources distributing system (including access to capital, skilled labour, specialized industrial services, etc.). Ongoing investment in parts and components suppliers, advertising, and marketing of franchises determines an overall localization that can be sustained only if these forces are not reduced or weakened, e.g., increasing unemployment levels that tend to reduce the car market, accentuating the relocation efforts aimed at different intermodal facilities.

Manufacture sector provides higher number of job opportunities for both male and female genders. As the industry grows it opens employment in various fields, such as marketing, research, design, sales, and services. Gender inclusivity has become a priority, with more women entering roles traditionally dominated by men, such as engineering and production. Similarly, men and women both play vital roles in administration, finance, and customer services. The sector's commitment to diversity ensures equal access to economic opportunities, helping to bridge gender employment gaps while supporting overall economic development (Michelle Lytle et al., 2019). However, the industry faces challenges that directly affect workers, especially women. Global conflicts, such as wars and political instability, disrupt supply chains and raise costs, forcing companies to cut jobs. This can hit lower-wage workers,



including many women, the hardest. Neoliberal policies, which push for deregulation and cost-cutting, lead to outsourcing or automation. This can reduce job opportunities, especially for local workers. Women, often in lower-wage jobs, may be more impacted when roles like customer service or administration are outsourced or automated (Lena McKnight & Stefan Fahrni, 2024). Climate change also affects the industry, as regulations push companies toward eco-friendly technologies like electric vehicles. While this opens new opportunities, it also risks leaving behind workers who lack the skills for these new roles. Women, often in lower-skilled jobs, may face more challenges in adapting to these changes.

Table 1 Labor Force Participation Rate Data of women and men

Year	Female (%)	Male (%)	Total (%)
1995	50.5%	78.1%	64.2%
2000	50.2%	77.1%	63.5%
2005	49.8%	76.1%	62.9%
2010	48.8%	75.4%	62.1%
2015	48.2%	74.2%	61.1%
2020	46.7%	71.7%	59.2%
2023	48.7%	73.1%	60.9%
¹ This data source has been taken from the world bank group. <a href="https://genderdata.worldbank.org/en/indicator/sl-tlf-act-
zs?view=trend&geos=WLD">https://genderdata.worldbank.org/en/indicator/sl-tlf-act- zs?view=trend&geos=WLD			

The Labor Force Participation Rate (LFPR) data, as shown in Table 1, reflects a declining trend in both male and female workforce engagement over the years, with notable fluctuations in women’s participation. In 1995, the LFPR for women stood at 50.5%, gradually decreasing to 46.7% in 2020, before rising to 48.7% in 2023. The male participation rate similarly declined from 78.1% in 1995 to 71.7% in 2020, followed by a slight increase to 73.1% in 2023. This data suggests that, despite the efforts toward gender inclusivity, external pressures, including economic challenges and job market shifts, continue to impact labour participation.

The overall LFPR decreased from 64.2% in 1995 to 59.2% in 2020, then slightly rose to 60.9% by 2023. This general decline aligns with the observed trends in global economic shifts, reflecting challenges in the manufacturing sector such as job outsourcing, automation, and the adoption of new technologies. The recent uptick in 2023 may indicate an initial response to gender-inclusivity efforts

and an increased focus on sustaining workforce participation among both men and women. However, ongoing external pressures, including economic, technological, and environmental challenges, remain pivotal factors shaping the labour market and influencing participation rates across genders.

Impact of neoliberal policies in Manufacture industries on women workers.

Table 2 Neoliberal Policies

Year	Policy	Region/Country & Description
1970s	Emergence of Neoliberalism	Global - Neoliberal ideas began influencing economic policies, promoting free markets, limited government, and deregulation as effective economic strategies (Julie MacLeavy, 2024).
1973	Chilean Economic Reforms	Chile - Under Pinochet's regime, Chile adopted neoliberal policies such as privatization and free-market reforms, often cited as the first major neoliberal experiment (Cristian Moran, 1989).
1978	Economic Reforms in China	China - Initiated by Deng Xiaoping, China's market reforms opened the economy to foreign investment and market mechanisms, marking the shift from central planning (Meg Rithmire, 2023).
1979	Thatcherism Begins	United Kingdom - Margaret Thatcher's government implemented pro-market policies, privatizing state-owned industries, and reducing union influence (Peter Oppenheimer, 1989).
1980	Reaganomics Begins	United States - President Ronald Reagan introduced policies focused on tax cuts, deregulation, and reducing government spending (Morgan Beckerman, 2023).
1980s	Structural Adjustment Programs	Developing Countries - IMF and World Bank imposed market-driven reforms on developing nations, emphasizing deregulation, privatization, and free trade in exchange for loans (Marcelo Selowsky, 1987).
1986	Big Bang Deregulation	United Kingdom - The City of London underwent major deregulation in financial markets, allowing for increased competition and foreign involvement (Christopher Bellringer & Ranald Michie, 2014).
1990	Economic Liberalization in India	India - India opened its economy, reduced tariffs, and initiated financial deregulation, leading to rapid growth and increased foreign investment (Zhenhui Xu & Pal, 2022).
1991	Collapse of Soviet Union	Eastern Europe - Transition from planned economies to market economies in former Soviet and Eastern Bloc countries, leading to widespread privatization and deregulation (Ferrucci, 2020).
1993	European Single Market	European Union - Creation of a single market for goods, services, people, and capital in the EU, promoting competition and market-driven policies (Panagiotis Liargovas & Christos Papageorgiou, 2023).
1999	Financial Services Modernization Act	United States - Allowed the merging of commercial and investment banks, leading to deregulation in the financial industry (I-Ju Chen et al., 2020).
2000s	Global Rise of Neoliberal Policies	Global - Many countries embraced neoliberalism, with market-driven policies expanding globally, influencing trade, investment, and financial policies (Manfred B. Steger & Ravi K. Roy, 2010).
2008	Global Financial Crisis and Re-regulation Debates	Global - The crisis triggered debates on deregulation's role, leading to calls for increased regulation in financial markets, particularly in the U.S. and EU (James Copestake, 2010).
2010	Dodd-Frank Act	United States - U.S. Congress passed the Dodd-Frank Act to increase financial regulation, aimed at preventing another crisis by overseeing banks and financial institutions (Gregory P. Wilson, 2011).
2011	Eurozone Austerity Measures	The European Union imposed austerity measures on debt-stricken countries like Greece, Portugal, and Spain as part of bailout conditions, emphasizing budget cuts and structural reforms. These policies prioritized reducing government spending and privatizing state assets to control deficits (Philipp Heimberger, 2017).
2012	Privatization in Greece	Greece privatized significant assets, including railways and public utilities, to reduce public debt under EU and International Monetary Fund (IMF) pressure (Özgün Sarımeşmet Duman, 2022).
2013	Trans-Pacific Partnership (TPP)	TPP negotiations accelerated among 12 Pacific Rim countries, focusing on reducing tariffs and promoting investor protections. This policy initiative intended to deepen market access and favour multinational corporations (Kamala Vainy Pillai et al., 2016).
2013	Labor Reforms in India	The Indian government began implementing labour reforms that simplified labour laws, aimed at attracting foreign investment and increasing manufacturing competitiveness (Nagar, 2017).



2015	TPP Finalization	The TPP was finalized, creating a large free-trade zone, although the United States later withdrew in 2017 (Deborah Gleeson et al., 2018).
2015	France's Labor Law Reforms	President Emmanuel Macron introduced reforms aimed at providing businesses with more flexibility in hiring and firing employees, aligning with neoliberal economic policies that prioritize business over worker protections (Daniel Blackburn, 2016).
2017	Deregulation in the United States	President Donald Trump initiated major deregulation efforts, including reversing environmental protections and dismantling financial regulations like the Dodd-Frank Act, reducing restrictions on banking practices. His administration promoted tax cuts for corporations, aimed at stimulating economic growth through corporate expansion (Cary Coglianese et al., 2021).
2018	CPTPP Agreement	After the U.S. exit from the TPP, 11 countries proceeded with the agreement, focusing on trade liberalization.
2018	China's Belt and Road Initiative (BRI)	China's Belt and Road Initiative (BRI) expanded, emphasizing infrastructure investments in developing countries, promoting private and public partnerships, and allowing Chinese firms broader market access.
2019-2020	COVID-19 Pandemic	Many governments responded with economic stimulus packages, yet neoliberal policies continued with calls for economic 'recovery' focused on deregulation and private sector-driven growth. The pandemic highlighted healthcare systems' privatization and underfunding, especially in the United States and the United Kingdom, where private firms played a large role in vaccine distribution.
2021	India's Privatization Plan	The Indian government announced the privatization of multiple state-owned enterprises, including banks, railways, and utilities, to reduce government debt and attract foreign investment.
2022	Expansion of Automation and Deregulation in Tech	As automation and digital platforms gained traction, governments promoted deregulation to attract tech companies, often at the expense of labour protections. Tech companies, benefiting from minimal restrictions, consolidated economic power in sectors like e-commerce and gig work.
2023	Technology and Automation Focus	Automation and digital platforms continued to grow, with governments focusing on deregulation to promote rapid growth and expansion in the tech sector.
2024	Global Expansion of Neoliberal Policies	Many governments in Latin America, Africa, and Asia have increased openness to foreign investments in industries such as energy, agriculture, and technology, reinforcing neoliberal ideals of market-based economies.

Deregulation and market-driven policies mention in Table 2 are given importance to the development of industry and encourage the reduction of government intervention across various sectors. Especially in labour markets in manufacture industries, this has led to increased labour flexibility by avoiding the traditional employment procedure. So, companies are start hiring temporary workers, offering part-time jobs, and outsourcing the products. These practices allow companies to reduce labour costs, making their operations competitive on a global scale. These approaches bring significant challenges to the labour market, with negative consequences for labourers. Deregulation in the manufacture industry has led to more contract and temporary jobs. Unlike permanent workers, these employees don't get the same benefits or protections (Gabriele Ciminelli et al., 2018). A good example is General Motors (GM) in the U.S., where more temporary workers have been hired to do the same work as permanent employees but for lower pay and without long-term benefits. In 2019, this created tension and led to a major strike by the United Auto Workers (UAW) (Neal E. Boudette, 2019). The strike was against GM's growing use of temporary workers, which had divided the workforce into two groups—one with stable jobs and benefits, and the other facing uncertain, lower-paid working conditions(Campbell, 2019). Neoliberal policies have made outsourcing a popular way of reducing cost by business in automotive sectors around the world. Automakers hire specialised companies to do non-essential jobs like logistics and making parts. These companies are often based in countries with lower wages and fewer rules about working conditions. Ford, like many other companies, sends a lot of the work that goes into making its parts to cheaper countries like China and Mexico. This saves companies money, but it has cost jobs and kept wages



the same in places like the U.S. and Europe, where labour is more expensive. The quality of jobs in the car industry has gone down because of these flexible labour policies, which may have cut costs. People who used to have stable, well-paying jobs that were guaranteed for life now have short-term contracts with less pay and perks. This fits with a larger trend in neoliberalism: cutting costs often comes at the cost of workers' health and job stability.

Privatization and Corporate Power: Neoliberalism, through landmark policies like the Chilean Economic Reforms (1973), Thatcherism in the United Kingdom (1979), Reaganomics in the United States (1980), Structural Adjustment Programs in developing nations during the 1980s, and Economic Liberalization in India (1990), promoted the privatization of public enterprises and reduced government involvement, reshaping industries. The collapse of the Soviet Union and Eastern European transition (1991) further accelerated this trend, leading to the global rise of neoliberal policies by the 2000s. This wave of neoliberal reforms paved the way for powerful multinational corporations to benefit from immediate economic growth, market dominance on a global scale, takeovers, and reduced competition. This corporate power has had substantial effects on the workforce. As large corporations grow stronger, their influence over policymaking has also increased. In some countries, they have lobbied to relax environmental and safety regulations, raising concerns for worker well-being and exacerbating workplace inequality. Large firms often adopt cost-cutting measures, such as reducing wages and benefits on one hand and outsourcing labour to cheaper markets on the other, placing workers in increasingly alienated conditions. Workplace discrimination trends often create unequal environments for marginalized groups, such as women, who are more likely to face job insecurity, limited advancement opportunities, and poor working conditions. Furthermore, multinational corporations operating in countries with weaker labour laws often offer significantly different pay and conditions depending on the local economic context, leading to regional disparities in wages and job quality (David Harvey, 2005). An example of how privatization and corporate power create inequality in the workplace can be seen with multinational car companies in places like Eastern Europe and Southeast Asia. After the privatization of the auto industry in countries like Poland and Hungary, companies like Volkswagen and Fiat moved in, taking advantage of lower costs and fewer regulations (Saul Estrin & Adeline Pelletier, 2018). They paid local workers much less than what they paid in Western Europe for the same jobs, leading to wage gaps within the same company. These multinationals also outsourced jobs to countries like India and Bangladesh, where workers, especially women and minorities, faced lower pay, unstable jobs, and poor safety protections. Women were often paid less than men for the same work and had fewer chances to move up. Smaller local companies couldn't compete and were often taken over by these large corporations, leading to job



losses and worsening economic inequality (Anthony Kamande, 2024). This shows how privatization and less regulation can make the workplace more unequal, especially for vulnerable workers (Amitabh Behar, 2024).

In the last few decades, neoliberal policies have pushed for less government control and the growth of markets around the world. In the US, the Financial Services Modernisation Act of 1999 loosened restrictions on the financial sector. International agreements like the Trans-Pacific Partnership (TPP) and its successor, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), also aimed to open markets, make trade easier, and lower regulatory hurdles for businesses. China's Belt and Road Initiative (BRI) also aimed to improve trade and build more roads and bridges in Asia, Africa, and Europe. All these policies pushed businesses around the world to use new technologies and automate more, often to stay competitive in a fast-paced, unregulated global market. The COVID-19 epidemic accelerates the digital revolution. Automation became a solution for companies struggling with limited resources and a smaller workforce to keep output while lowering human interaction. This resulted in a spike in digital adoption as even usually labour-intensive businesses embraced automation. Since then, policies have continued to favour the reduction of barriers to technological deployment, including 2022's expanded automation deregulation and a global focus on technology and automation in 2023-2024 (Richard Kirk, 2024). While these shifts have driven economic growth and innovation, they've also had profound impacts on labour, particularly for women workers. Industries that employ significant numbers of women such as textiles, retail, and hospitality are highly susceptible to automation due to the repetitive nature of many roles. As businesses automate these tasks, many women are displaced, facing job insecurity and reduced income opportunities. The adoption of advanced technologies without adequate regulatory oversight can exacerbate gender inequality in labour markets.

Deregulation and Gender issues of women in manufacturing industries.

The neoliberal shift in manufacturing and related industries has significantly impacted women workers, largely due to employers' increasing investment in advanced machinery. As companies adopt high-cost, complex equipment, they prioritize retaining employees who can operate these new machines, often leading to layoffs for those unable to adapt. This shift has disproportionately affected women, many of whom have limited access to upskilling opportunities compared to their male counterparts (Masrail Al Salaheen et al., 2024). Moreover, deregulation in these industries allows for around-the-clock operations, creating a demand for employees to work both day and evening shifts. This 24/7 operational model places additional strain on female workers, especially those with familial and caregiving responsibilities, leading to a preference for hiring men who are perceived as more flexible for shift-based work. Gender disparities also emerge during pregnancy, as women are often



unable to work for five to eight months, prompting employers to favour male employees who are seen as "uninterrupted" labour sources. Many manufacturing firms lack policies for temporarily filling roles during maternity leaves, further reinforcing the perception that men are more reliable hires (Jeong-Won Oh et al., 2023).

Gender based power issues

The workplace hierarchy in manufacturing industries is notably male-dominated, perpetuating power imbalances and gender-based discrimination that restrict women's career advancement. The disproportionate representation of men in higher positions reflects deeply entrenched gender biases within the manufacturing sector. This gender disparity isn't merely incidental; it is often a result of long-standing structural and cultural norms that favour male employees, particularly in managerial and high-responsibility roles. For instance, according to a study by the International Labour Organization, women make up a significant portion of the lower-tier workforce in manufacturing but hold only a small percentage of top-tier leadership roles. This discrepancy underscores the systemic barriers that women face, limiting their upward mobility (International Labour Office & Wirth-Dominicé, 2015). Promotions are influenced by informal networks and mentorship opportunities, which are predominantly male-oriented. Male managers, often hesitant to mentor women due to perceived gender differences, inadvertently reinforce the cycle by keeping key decision-making roles within male-dominated circles. For example, a report by the "KC Group highlights that women frequently lack access to critical projects, hindering their visibility and chances of ascending to leadership positions. In some cases, manufacturing companies have policies that unintentionally favour men. For instance, performance appraisals in physically demanding jobs may include criteria related to physical endurance or availability for overtime, which may disadvantage women who balance household responsibilities or face bias around their physical capacity. Additionally, in family-owned or male-led firms, there may be an implicit preference for male successors, reinforcing male leadership and limiting the scope for women to step into higher roles (Calvin Wang, 2010). This bias has far-reaching effects. When women do achieve managerial roles, they often face scrutiny and microaggressions that undermine their authority, creating a hostile work environment. For example, female managers may experience resistance from male subordinates who question their decisions or assert their authority in subtle ways. This can discourage other women from seeking promotions, further compounding the structural disadvantage (Frank Mu et al., 2024). Moreover, the male-dominated hierarchy has financial implications for women. With fewer opportunities for advancement, women in manufacturing generally earn lower wages over time, contributing to the gender pay gap in the sector. Research indicates that even when women hold equivalent roles, their



pay tends to be lower, often due to a lack of negotiation support or advocacy within the organizational structure.

The Present study

The present study, this study analyses the ergonomic implications of neoliberal policies, and technological advancements on manufacturing labour, particularly emphasizing gender-based inequities. Ergonomics in manufacturing extends beyond physical comfort, intersecting with social and economic factors that shape workplace environments and impact worker well-being. The rise of temporary and outsourced labour under neoliberal frameworks, driven by cost-cutting and efficiency, has intensified job instability and reduced access to consistent ergonomic protections for many workers, especially in roles vulnerable to outsourcing, such as automotive and textile sectors. Gender-specific challenges emerge as female workers often face limited access to ergonomic accommodations, training, or upskilling opportunities, placing them at a disadvantage in adapting to automation and advanced machinery. As production shifts toward 24/7 operations, female employees many balancing caregiving duties face strain due to inflexible work hours, reinforcing a preference for male workers perceived as better suited for these demands. Furthermore, structural biases embedded in male-dominated hierarchies restrict women's advancement to supervisory or ergonomic decision-making roles, which often results in less attention to gender-specific ergonomic needs. This study underscores how these systemic pressures, coupled with ergonomic neglect, amplify workplace discomfort, increase injury risks, and perpetuate gender disparities, ultimately affecting productivity and employee retention. By exploring these dynamics, the research suggests that improved ergonomic policies that accommodate gender diversity and promote stability could foster a healthier, more equitable manufacturing environment, aligning economic efficiency with worker well-being.

The study objectives

Evaluate Ergonomic Challenges Faced by Women in Manufacturing. Explore how workplace ergonomics, including physical comfort, scheduling, and training, influence the productivity and well-being of female workers. Assess the level of access to ergonomic accommodations for women compared to men.

Assess the Impact of Neoliberal Policies on Women Workers in Manufacturing. To identify how deregulation, outsourcing, and automation affect job security and working conditions for women. Examine differences in employment types (permanent vs. temporary) for male and female workers.

Analyse Gender Disparities in Workplace Roles and Advancement Opportunities. Investigate the representation of women in leadership or decision-making roles compared to men. Examine structural



barriers, such as informal networks or biased performance appraisals, affecting women's career progression.

Methodology

This research employs a comparative analysis of male and female labourers across various departments within manufacturing industries and enterprises, including production lines, research and development, accounting, human resources, sales, and service. By examining gender differences in work responsibilities, authority, and time allocation within these sectors, the study aims to reveal the specific challenges and disparities that women encounter. This approach not only highlights the diverse roles and contributions of women but also provides a comprehensive understanding of their unique struggles and barriers in distinct professional domains, offering a nuanced perspective on gendered labour dynamics in manufacturing industries. The study's sample was drawn from industries labourers, with the sample size determined using a sample size formula to ensure statistical validity. Data collection was conducted through a structured questionnaire, designed to gather comprehensive insights from participants in the selected sample. This approach ensures a systematic and reliable data-gathering process, aligning with the study's objectives.

The sample size for this research is 180 Female and 138 male samples. This study employs a structured questionnaire for data collection from each participant. By dividing the sample into Male and female groups, we aim to capture generational differences in career trajectories and attitudes toward the evolving job landscape. We select samples from 3 different manufacturing industries or enterprises. We select these samples from the southern part of India in the state of Tamil Nadu. These 3 industries employed 1854 male and female. Due to the industries restrictions names are not mentioned.

the sample size (n) selected by using this formula:

$$n = n_0 / 1 + n_0 - 1/N$$

$$n_0 = z^2 p (1 - p) / E^2$$

Assumption:

- Significant level or confidence level: 95% (Z= 1.96)
- Error level: $\pm 5\%$ (E= 0.05)
- Probability value: P= 0.5
- Population size: (N= 1854)

Calculate the sample size without population size (n_0):



$$n_0 = z^2 p (1 - p) / E^2$$

$$n_0 = (1.96)^2 0.5 (1 - 0.5) / (0.05)^2$$

$$n_0 = 384.16$$

Calculate the sample size with population size (n):

$$n = n_0 / 1 + n_0 - 1/N$$

$$n = 384.16 / 1 + 384.16 - 1/ 1854 = 318.36$$

So, the sample size with population size (n) is approximately 318.36, rounded to 318 samples. (n = 318)

The systematic sampling method was adapted to select the samples. This sampling selecting sample from an ordered sampling frame.

Determine the sampling interval (**K**): K calculated by dividing the population size N to find sample size **n**.

$$K = 1854/318$$

$$K = 5.82 \text{ round to the nearest integer } K = 6$$

By using this sampling interval K= 6 selected the sample 6,12, 18...., 318.

In this sample size of 318, female samples are 180 (60 female from each industry) and male samples are 138 (46 male from each industry).

Survey measures

Our empirical aims are to explore: (a) Ergonomic Challenges Faced by Women in Manufacturing, focusing on how workplace ergonomics, scheduling, and training influence productivity and well-being. (b) The Impact of Neoliberal Policies on Women Workers, examining how deregulation, outsourcing, and automation affect job security and working conditions. (c) Gender Disparities in Workplace Roles and Advancement Opportunities, analysing the representation of women in leadership roles and structural barriers hindering their progress.

Workplace Comfort: How would you rate the physical comfort of your workplace environment?

a. Very Comfortable, b. Comfortable, c. Neutral, d. Uncomfortable, e. Very Uncomfortable.

Are you provided with proper equipment designed for ergonomic safety? a. Yes b. No

The physical comfort of a workplace environment significantly impacts employee productivity and overall well-being. A "Very Comfortable" or "Comfortable" environment typically includes adequate lighting, optimal temperature, sufficient space, and furniture designed for comfort. In contrast, a "Neutral" or "Uncomfortable" setting may indicate inadequacies in these aspects, such as cramped



spaces or excessive noise levels, which can lead to dissatisfaction or even physical strain over time. Regarding ergonomic safety, being provided with proper equipment is essential to preventing work-related injuries, such as musculoskeletal disorders. Ergonomic equipment includes adjustable chairs, desks at the correct height, and supportive keyboard and mouse designs. If such provisions are available, employees are more likely to maintain a healthy posture, reduce strain, and enhance their efficiency. However, if ergonomic safety measures are neglected, workers may face discomfort, leading to health issues and decreased productivity. Employers should prioritize investing in ergonomic solutions to foster a supportive and health-conscious work environment.

Scheduling Challenges: How manageable are your work shifts given your personal responsibilities?

a. Very Manageable, b. Manageable, c. Neutral, d. Difficult, e. Very Difficult.

Do you face difficult balancing care giving responsibilities with work schedules? a. Yes b. No

The manageability of work shifts plays a crucial role in an employee's ability to maintain a healthy work-life balance. When work shifts are "Very Manageable" or "Manageable," employees often find it easier to coordinate their professional and personal responsibilities, leading to reduced stress and greater satisfaction. On the other hand, shifts rated as "Difficult" or "Very Difficult" can create conflicts, especially for those juggling caregiving responsibilities, resulting in fatigue and decreased job performance. Balancing caregiving responsibilities with work schedules can be challenging for many employees, particularly those with children, elderly family members, or individuals requiring special care. If the answer is "Yes," it indicates that inflexible or unpredictable work hours may make it hard to fulfil both roles effectively. Employees might experience guilt or stress from neglecting personal duties or feeling unproductive at work. Conversely, if the answer is "No," it reflects a supportive work environment, potentially offering flexible scheduling, remote work options, or caregiving benefits, which enable employees to meet both their professional and personal commitments without undue strain.

Job Security: How secure do you feel in your current job? a. Very Secure, b. Secure, c. Neutral, d.

Insecure, e. Very Insecure. Have you noticed a shift toward temporary or contract-based employment in your workplace? a. Yes, b. No.

The sense of job security is a critical factor influencing employee morale and engagement. Employees who feel "Very Secure" or "Secure" in their jobs often exhibit higher levels of commitment and productivity, as they trust their roles are stable and valued. Conversely, feelings of "Insecurity" or "Very Insecurity" can lead to stress, reduced motivation, and even disengagement, as workers may worry about layoffs, downsizing, or unstable market conditions. The shift toward temporary or contract-based employment is a trend observed in many industries. If the answer is "Yes," it suggests that the workplace may be transitioning away from traditional long-term roles, favouring flexibility and cost-cutting measures. While this approach can benefit businesses by meeting fluctuating



demands, it often leaves employees feeling less stable, with fewer benefits and limited career growth opportunities. On the other hand, if the answer is "No," it implies a continued emphasis on permanent positions, which typically foster greater loyalty and stability among employees.

Working Conditions: How would you rate the fairness of working conditions for women compared to men? a. Very Fair, b. Fair, c. Neutral, d. Unfair, e. Very Unfair.

Are women disproportionately affected by outsourcing or job cuts in your organization? a. Yes, b. No. The fairness of working conditions for women relative to men is a vital indicator of workplace equality. When rated as "Very Fair" or "Fair," it reflects an environment where both genders have equal access to opportunities, pay, and support, fostering inclusivity and mutual respect. A "Neutral" rating may indicate ambiguity or mixed perceptions about gender equality in the workplace. However, if rated "Unfair" or "Very Unfair," it highlights existing gender biases, such as unequal pay, limited leadership roles for women, or discriminatory practices, which can lead to dissatisfaction and reduced workplace diversity. When asked whether women are disproportionately affected by outsourcing or job cuts, a "Yes" response suggests a concerning trend where women may be overrepresented in roles considered expendable or subject to downsizing. This can exacerbate existing gender inequalities, as women are often concentrated in lower-paying or less secure positions. A "No" response indicates that the organization handles job restructuring equitably, ensuring no undue burden falls on one gender, thereby promoting a fair and balanced workplace environment.

Employment Types: What is your employment type? a. Permanent, b. Temporary, c. Contract, d. Freelance.

Are temporary workers provided the same benefits as permanent workers? a. Yes, b. No.

Understanding employment types helps evaluate the workforce structure and benefits within an organization. Permanent employees typically enjoy greater stability, access to full benefits, and opportunities for career advancement. Temporary, contract, or freelance workers often bring flexibility to the workforce but may experience limited job security and fewer perks compared to permanent staff. When asked whether temporary workers receive the same benefits as permanent workers, a "Yes" response reflects an equitable and inclusive workplace policy, where all employees are treated fairly, irrespective of their employment type. This can include access to health insurance, paid leave, training, and development opportunities. However, if the answer is "No," it indicates a disparity where temporary workers may lack essential benefits, creating a sense of inequality. Organizations prioritizing fair treatment of temporary staff foster higher morale and productivity across the workforce while promoting a positive employer reputation.

Representation in Leadership: How would you rate the representation of women in managerial positions? a. Excellent, b. Good, c. Neutral, d. Poor, e. Very Poor.



Are there women in leadership or decision-making roles in your organization? a. Yes, b. No.

The rating of women’s representation in managerial positions provides deeper insights into workplace equality. An "Excellent" or "Good" rating suggests that women are well-represented in managerial roles, contributing to diverse perspectives and balanced decision-making. A "Neutral" rating may indicate moderate representation without substantial efforts to improve it. Meanwhile, "Poor" or "Very Poor" ratings highlight significant gaps, suggesting the need for targeted interventions such as mentorship programs, leadership training for women, and equitable promotion practices to address systemic challenges and enhance gender diversity in leadership. The presence of women in leadership or decision-making roles is a strong indicator of gender inclusivity and diversity within an organization. If the response is "Yes," it reflects progress toward breaking traditional barriers and fostering a culture of equal opportunities. However, a "No" response points to a lack of representation, which may signal underlying biases or insufficient policies to support women’s advancement.

Barriers to Advancement: How would you rate the effectiveness of organizational policies in promoting gender equality in advancement opportunities? a. Very Effective, b. Effective, c. Neutral, d. Ineffective, e. Very Ineffective.

Have you faced challenges due to informal networks or biased evaluations? a. Yes, b. No.

The effectiveness of organizational policies in promoting gender equality in advancement opportunities is crucial in creating an equitable workplace. If rated as "Very Effective" or "Effective," it suggests that the organization has robust measures, such as transparent promotion processes, mentorship programs, and diversity initiatives, to ensure equal opportunities for all genders. A "Neutral" rating indicates room for improvement, while "Ineffective" or "Very Ineffective" ratings highlight gaps, such as inconsistent implementation of policies, lack of accountability, or insufficient focus on gender diversity. When asked about challenges due to informal networks or biased evaluations, a "Yes" response suggests that hidden barriers, like favouritism in informal networks or subjective performance reviews, hinder equitable career growth. These issues can disproportionately affect underrepresented groups, including women, by limiting their access to opportunities and decision-makers. Conversely, a "No" response reflects a fair and meritocratic environment where employees are evaluated based on objective criteria and have equal access to advancement resources, fostering trust and inclusivity within the organization.

Result

Table 3 Mann-Whitney Test

	Gender	N	Mean Rank	Sum of Ranks
How would you rate the physical comfort of your workplace environment?	Male	138	161.76	22323.00
	Female	180	157.77	28398.00
	Total	318		
How manageable are your work shifts	Male	138	213.86	29512.50



given your personal responsibilities?	Female	180	117.83	21208.50
	Total	318		
How secure do you feel in your current job?	Male	138	198.52	27396.00
	Female	180	129.58	23325.00
	Total	318		
How would you rate the fairness of working conditions for women compared to men?	Male	138	207.39	28619.50
	Female	180	122.79	22101.50
	Total	318		
What is your employment type?	Male	138	161.61	22302.00
	Female	180	157.88	28419.00
	Total	318		
How would you rate the representation of women in managerial positions?	Male	138	111.04	15324.00
	Female	180	196.65	35397.00
	Total	318		
How would you rate the effectiveness of organizational policies in promoting gender equality in advancement opportunities?	Male	138	228.74	31566.00
	Female	180	106.42	19155.00
	Total	318		

Table 3: The Mann-Whitney U Test results compare the differences in perceptions between males and females regarding various workplace aspects. For the physical comfort of the workplace environment, males (161.76) and females (157.77) show similar mean ranks, indicating no major difference in perception. However, for work shifts' manageability, males (213.86) have significantly higher ranks than females (117.83), suggesting males find them more manageable. Regarding job security, males (198.52) feel more secure than females (129.58). When rating the fairness of working conditions for women compared to men, males (207.39) perceive them more positively than females (122.79). Employment type shows no significant difference, with mean ranks for males (161.61) and females (157.88) being close. In contrast, females (196.65) rate the representation of women in managerial positions significantly higher than males (111.04), reflecting differing perspectives. Lastly, males (228.74) perceive organizational policies promoting gender equality in advancement opportunities as more effective than females (106.42), highlighting a disparity in views.

Table 4 Frequency statistics.

Question	Response	Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Male	138	43.4	43.4	43.4
	Female	180	56.6	56.6	100.0
Are you provided with proper equipment designed for ergonomic safety?	Yes	154	48.4	48.4	48.4
	No	164	51.6	51.6	100.0
Do you face difficulty balancing caregiving responsibilities with work schedules?	Yes	207	65.1	65.1	65.1
	No	111	34.9	34.9	100.0



Have you noticed a shift toward temporary or contract-based employment in your workplace?	Yes	197	61.9	61.9	61.9
	No	121	38.1	38.1	100.0
Are women disproportionately affected by outsourcing or job cuts in your organization?	Yes	270	84.9	84.9	84.9
	No	48	15.1	15.1	100.0
Are temporary workers provided the same benefits as permanent workers?	Yes	4	1.3	1.3	1.3
	No	314	98.7	98.7	100.0
Are there women in leadership or decision-making roles in your organization?	Yes	108	34.0	34.0	34.0
	No	210	66.0	66.0	100.0
Have you faced challenges due to informal networks or biased evaluations?	Yes	92	28.9	28.9	28.9
	No	226	71.1	71.1	100.0

The table 4: The survey responses highlight critical insights into workplace dynamics and gender-based disparities. Of the 318 respondents, 43.4% were male, and 56.6% were female, indicating a slightly higher female representation. A slight majority (51.6%) reported not being provided with ergonomic safety equipment, reflecting potential concerns about workplace safety standards. Balancing caregiving responsibilities with work schedules emerged as a significant challenge, with 65.1% affirming this difficulty, particularly for women. Temporary or contract-based employment is prevalent, with 61.9% noticing a shift towards such roles, and a vast majority (84.9%) believe women are disproportionately affected by outsourcing or job cuts, highlighting a gendered impact of organizational changes. Alarminglly, 98.7% reported that temporary workers do not receive the same benefits as permanent employees, underlining inequities in employment conditions. Leadership representation for women remains low, with only 34% acknowledging women in decision-making roles, while 66% observed their absence. Furthermore, challenges related to informal networks or biased evaluations were noted by 28.9%, indicating issues with workplace inclusivity and fairness. These findings underscore significant gender and employment-based disparities, highlighting areas requiring immediate attention to ensure a more equitable workplace environment.

Discussion

The findings presented in Tables 3 and 4 highlight pervasive gender-based disparities and systemic challenges in manufacturing workplaces, revealing critical insights into how these issues manifest. Table 3's Mann-Whitney U Test results provide a statistical basis for understanding gendered perceptions across various workplace dimensions, which align with the broader trends discussed in Table 4's frequency statistics. For instance, males rated the manageability of work shifts significantly higher (mean rank 213.86) compared to females (mean rank 117.83), reinforcing findings from Table 4 that 65.1% of respondents—predominantly women—struggled to balance caregiving

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responsibilities with work schedules. This reflects systemic biases in workplace policies, as women often face inflexible scheduling that exacerbates the "double burden" of professional and familial obligations, a phenomenon highlighted by Oh et al. (2023). Similarly, males expressed a higher sense of job security (mean rank 198.52) than females (mean rank 129.58), correlating with Table 4's finding that 61.9% of respondents observed a shift toward temporary or contract-based employment. This aligns with Boudette's (2019) analysis of General Motors' practices, where temporary employment disproportionately affected vulnerable groups, particularly women in lower-wage roles. The statistical data in Table 3 further shows that males perceived organizational policies promoting gender equality in advancement opportunities as more effective (mean rank 228.74) than females (mean rank 106.42), which underscores Table 4's finding that only 34% of respondents recognized women in leadership roles. These results reflect structural barriers such as informal networks and biased evaluations, identified by 28.9% of respondents in Table 4 and corroborated by Wang's (2010) research on male-dominated mentorship practices limiting women's career progression. Leadership representation disparities are also evident in Table 3, where females rated the representation of women in managerial positions significantly higher (mean rank 196.65) than males (mean rank 111.04). This discrepancy suggests that while women may perceive incremental progress in leadership representation, systemic biases persist, as noted in Table 4's finding that 66% of respondents reported the absence of women in decision-making roles. Such barriers not only hinder women's advancement but also contribute to wage gaps and reduced influence on organizational policies, as discussed by Harvey (2005). Both tables reflect systemic inequities in employment conditions. Table 3's data on employment type shows minimal gender differences in perception (mean ranks: males 161.61, females 157.88), yet Table 4 reveals that 98.7% of respondents reported that temporary workers lack the same benefits as permanent employees. This aligns with Estrin & Pelletier's (2018) findings that multinational corporations exploit weaker labour protections, often in regions with significant gender disparities, exacerbating inequities in job quality and security. The ergonomic and inclusivity challenges highlighted in both tables point to the urgent need for comprehensive policy reforms. Organizations must prioritize gender-sensitive ergonomic accommodations, flexible scheduling, and equitable access to training and leadership opportunities. Regulatory frameworks should enforce parity in benefits for temporary workers and mandate accountability in hiring practices. As emphasized by Harvey (2005) and supported by the findings in Tables 3 and 4, addressing these systemic inequities is essential for fostering a more inclusive and equitable manufacturing sector that aligns economic efficiency with social justice.

Conclusion



This research underscores the significant gender-based disparities and systemic challenges faced by workers in the manufacturing sector, particularly women, in the context of neoliberal policies, and technological advancements. The findings, supported by Tables 3 and 4, highlight critical issues such as job insecurity, inequitable workplace policies, limited ergonomic support, and barriers to career progression for women. The statistical evidence reveals that women disproportionately face challenges balancing caregiving responsibilities, navigating inflexible schedules, and adapting to temporary or contract-based employment. These issues are compounded by systemic biases that hinder their access to leadership roles and equitable treatment in the workplace. The analysis also emphasizes how neoliberal policies, such as deregulation and outsourcing, have exacerbated inequalities by prioritizing cost-cutting measures over worker welfare. The decline in permanent jobs and the rising prevalence of temporary or contract-based employment have disproportionately impacted women, limiting their access to benefits and job security. These trends align with global findings, such as those of Harvey (2005) and Estrin & Pelletier (2018), who identified similar patterns of exploitation in regions with weaker labour protections. Moreover, the limited representation of women in leadership positions, as highlighted by both tables, points to structural barriers like informal networks, biased evaluations, and male-dominated hierarchies. These barriers not only restrict women's career advancement but also perpetuate the gender wage gap and undermine workplace inclusivity. To address these challenges, the research advocates for comprehensive policy reforms, including gender-sensitive ergonomic accommodations, equitable scheduling, and robust training programs to upskill women for advanced roles. Regulatory frameworks must enforce parity in benefits for all employment types and promote accountability in hiring practices. By fostering inclusivity and addressing systemic inequities, the manufacturing sector can create a more equitable and sustainable environment that aligns economic growth with social justice and worker well-being.

Ethical consideration.

The questioner of this research article was ethically approved by the department of sociology and social work of Annamalai University.

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