Undergraduate Thesis Prospectus

Shaping the Future of Work:

Competing Interests in Automation in U.S. Manufacturing

(sociotechnical research project)

by

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General research problem

How will the increasing use of automation and AI across various industries reshape the global labor market?

Automation and artificial intelligence (AI) technologies are transforming global labor markets, replacing human workers in roles from manufacturing and logistics to finance and customer service. While automation aims to boost productivity and lower costs, it also raises critical questions about job displacement and economic inequality. Low- and mid-skilled workers, who often perform repetitive or manual tasks, are especially vulnerable to replacement by machines (Stropoli, 2023). This shift affects workers' livelihoods, job stability, and the demand for human labor. Understanding how AI can reshape labor dynamics can create adaptive workforce policies and mitigate potential socioeconomic impacts.

Shaping the Future of Work: Competing Interests in Automation in U.S. Manufacturing

How are employers, workers, and technology companies in U.S. manufacturing competing to shape the extent and nature of job automation?

In most economies, manufacturing hires the highest percentage of low- and mid-skilled workers, who are thus more at risk of losing their jobs to automation. The Brookings Institute estimates that while 25% of all U.S. jobs are at high risk of AI replacement, reporting "routine, predictable physical and cognitive tasks [are] the most vulnerable…in the coming years" (Muro et al., 2019). For employers, automation typically boosts efficiency and cuts costs, but it can displace workers, exacerbate inequality, and diminish employment opportunities. The International Labour Organization reports that the chances of workers in routine-based jobs losing their employment are higher as automation continues to grow. Changes in employment displacement resulting from

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automation affect some groups more than others, and the organization is looking for ways to lessen any associated negative impacts (ILO, 2021). This underscores the need to address how automation reshapes job opportunities, particularly for vulnerable workers.

Employment and wage inequality due to automation disproportionately affect low- and mid-skilled workers. Acemoglu and Restrepo (2020) explain that these effects are "concentrated in routine manual, blue-collar, assembly, and related occupations." This heightens job displacement risks for workers in routine roles as AI is integrated in the workplace. Bessen (2019) argues that while AI may not necessarily lower unemployment, it will "eliminate jobs in some occupations while creating new jobs in others." Thus, the problem likely lies not in job loss but rather job restructuring, with retraining programs needed to mitigate the impacts. Brynjolfsson and McElheran (2016) discuss how new technologies adopted by businesses can positively influence productivity. There is an urgency, therefore, to transition the labor market inline with rapidly evolving technologies.

Several key participants influence debates on automation and AI in manufacturing industries. Manufacturing firm General Motors (GM) seeks to improve profitability through incorporating AI and robotics, maintaining that automation is "the future of transportation" (General Motors, 2023). GM Director Jeff Abell (2023) claims that by "exposing technical staff to ... AI-related skills and abilities," GM can help its workforce adapt to AI. American businessman Mark Cuban asserts the amount of electricity and power needed to run much of these AI systems means jobs like "electricians, plumbers, and power engineers … are going to skyrocket" (Schulz & Singh, 2024), which are all blue-collar jobs. Siemens AG, a provider of AI-powered automation solutions, claims increased adoptions of their technologies is one path for manufacturing companies toward better productivity and higher profits (Siemens, 2023).

The International Association of Machinists and Aerospace Workers (IAMAW) is a labor union representing the rights of workers by ensuring fair compensation and maintaining employment levels. The union reports that on average, 100,000 American workers can be replaced with 200 robots, suggesting "heightened competition between workers" (IAMAW, 2023). McKinsey (2023) forecasts that by 2030, "one in sixteen workers may have to switch occupations." The source claims most job growth will be in high-skill jobs and low- and middle-skill jobs will decline. The U.S. Department of Labor, however, foresees upcoming AI progress affecting highly skilled positions as well (U.S. DOL, 2023). Ultimately, the goal is to make relevant policies and programs that transform the economy and business models as a whole.

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