

From Humans to Robots:
The Consequences of Labor Replacement in the Automobile Industry

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1. Introduction

It has been almost two centuries since the beginning of the Industrial Revolution and urban areas, economies, and cultures of nations across the world have been dramatically developing ever since. Human systems have undergone change at a remarkable rate, and the development of new technologies has aided in such transformations. One area of the economy that felt the effects of technological advancements is the automobile industry. This industry has experienced a variety of changes both inside the plant, with the advancement of production techniques, and outside the plant, with new car designs and feature improvements. This has led to micro-level changes in regard to those directly involved in automobile production and macro-level changes in regard to companies, government agencies, and the economy in general. The introduction of robots into automobile assembly lines in manufacturing plants across the world has been at the heart of change for this human system. In countries like the United States and Japan, where there are the highest levels of automobile production, people have felt the effects of the robotic production shift in both positive and negative ways. New demands for educated specialists, an increase of unemployment of factory workers, and a shift in economic trends in countries with mass automobile production are three important aspects of this change.

II. History of Gasoline Automobile Production

The idea of employing a mass number of individuals to assist with the production of gasoline automobiles dates back to the car's invention at the end of the nineteenth century. Karl Benz of Mercedes Benz, Ransom Olds of Oldsmobile, and Henry Ford of Ford were the first major leaders of gasoline automobile production in Europe and North America, respectively. Their assembly plants were built in key locations and used the assembly line concept in the

production process. Massive numbers of employees were hired to work on various shifts of the assembly line. In North America, Henry Ford not only built a company, but also built a culture around automobile production. With his “five-dollar workday”, Ford offered struggling individuals a way out of poverty. He built an industry, not only by providing a stable employment opportunity, but by providing housing in village communities as well. Ford targeted his jobs towards those individuals who would help the economy in return. For example, an article about “fordism” discusses the connection between community living and purchasing power. It states, “...the village industry plants may have stemmed from Ford’s desire to stabilize the purchasing power of farmers in rural communities by providing a source of employment during slack agricultural periods” (Pietrykowski, 386). It continues by saying, “Farmers were a major early source of demand for Ford cars and trucks, and of course, Fordson tractors” (Pietrykowski, 386). Ford created a win-win situation for the economy. His industry provided jobs, which in turn lowered unemployment. It also instilled a sense of pride in the Ford Company amongst its employees, which in turn caused them to purchase a Ford vehicle, putting money back into the economy. This is a good example of how the introduction of a new industry is greatly beneficial to economies. Once Ford had established his industry in the United States, he began opening manufacturing plants around the world. He opened one plant in Japan, which marked the beginning of Japan’s large-scale automobile production.

Meanwhile, in Europe, the automobile industry leaders before World War II were Britain, France. Germany’s auto industry was lagging behind, but the Nazi-run Volkswagen, which translated to “the people’s car,” was their attempt to build an auto industry. Although the original goals of the project failed after the Nazis were defeated, post-war West Germany counted on a revitalized automobile industry to increase consumerism, and ultimately help its economy.

Volkswagen based its ideas on Fordism, but placed a great emphasis in distinguishing itself from Ford Motor Co. By modifying some of Ford's techniques and business practices, Germany dug its automobile industry out of crisis and amended the "people's project". The goal of the project is summarized in this statement; "The Volkswagen was promoted as the chief example of a group of 'people's products' being prepared or realized in order to raise consumption" (Konig, 249). Automobile production was used as a means for positive change to the country's economy. As a result, people's lives would be improved by the increased job opportunities in the new industry.

By the middle of the twentieth century, manufacturing jobs made up a significant part of the workforce in countries around the world. They provided opportunities for the lower and middle class citizens, who lacked the higher education needed for other professions. In America, the automobile industry had developed so much that the factory villages did not need to be built as a lure for workers. The industry was secure; the product was ubiquitous; the incentive of a secure job provided a steady supply of workers.

Technological advancements in the late 1970s and early 1980s brought a new outlook to the automobile industry. The development of the robot for manufacturing marked the beginning of change in this booming industry. Robots opened a world of possibilities for manufacturing plants. These wonder machines could assemble cars and car parts at a much greater rate of precision and at a much faster speed than the average human. From the company's standpoint, robots could significantly cut down on labor costs by requiring fewer employees. Since production efficiency is constantly in the interest of a company, the use of robotics provided the perfect solution for large automobile producers. These incentives led to companies altering the standard method of production established in the Ford and Volkswagen plants. With this change

came relief to some and concerns for others, as rising unemployment levels became an epidemic amongst ex-factory workers.

III. Positive Effects

The switch from manual labor power to robotic labor power in automobile manufacturing plants brought many positive changes when it entered the industry in the 1970s. As previously described, the benefits of robotics highly outweigh human labor capabilities. This is a huge benefit in the eyes of auto companies. When robots were first developed, their main usage was in automobile plants. Japan was the first country to utilize robots to their fullest. During the 1970s, the Japanese were in an oil crisis, and their labor costs were quickly rising. In an attempt to rebuild the economy, the Japanese turned to robotics for mass production of automobiles. An article entitled, “The Robots Are Here! The Robots Are Here!” looks at the why the Japanese turned to robots during their economic crisis. “Workers were in short supply, and few could be found to do dangerous or dirty jobs. Management consulted with labor and offered displaced workers retraining programs. The use of robots was stimulated by accelerated depreciation benefits and through leasing programs” (Webb 20). There were three major incentives that made this technological shift successful in Japan. First, many Japanese were not interested in minimal skill, lower paying jobs, like those in manufacturing. When the demand for unskilled labor declines, the economy suffers. Therefore, robots were the perfect solution to this problem. Second, for those individuals that were displaced by the new technology, the Japanese government provided them with support. This avoids the potential crisis of increasing unemployment rates and a decrease in consumerism. Lastly, as robots became more popular and the technology was refined, the cost of the robots decreased. The drastic decrease in the price of

robots allowed Japan to purchase mass quantities of robots, and as a result, become the number one manufacturer of automobiles. By addressing all sides of the issue when switching to robotics, then an economic crisis is avoided and the people are satisfied.

Another highly beneficial aspect of technology in the plant lies in the newfound ease to adjust designs to consumer demand. Unlike Japan, the United States only gradually introduced robots into the manufacturing plant, because they were not facing a potential economic crisis. American companies accelerated the switch to the new technology when they realized the ease of change that came with the new technology. Americans have a high demand for variety and change and automobile sales increase when cars are offered with hundreds of options. When using old manufacturing techniques, creating such options was a large ordeal that required slow equipment and labor changes inside the factory. Robotics eliminated this nuisance. An article discussing productivity in relation to technology expands on this idea.

[W]ith their computerized reprogram-ability, flexible machines such as robots are capable of producing a variety of new products, or old products produced in new ways.

The key advantage of such flexibility is that it obviates the need to scrap fixed capital in order to produce new products. Instead, machines can simply be reprogrammed, thereby extending their technical life. (Gertler 420)

The ability to make changes almost effortlessly is a great benefit to the automobile company, especially to those in America. In addition to this, robots can switch from one task to another without any downtime. Since they lack the needs of a human, they provide a steadier flow of work, which ultimately raises the efficiency of automobile production. Outside of the plant, consumers were delighted with the increased diversity in products, which caused them to purchase automobiles, and put money back into the economy.

An additional positive element of the restructuring of the auto industry is in the creation of new jobs. The key word that comes to mind when thinking about the restructuring of the industry is unemployment, but individuals often overlooked the large number of jobs that were created in this shift, on a global level. This can be hinted at in this journal article. “By the early 1980s, U.S. manufacturers faced competition [like] the diffusion of Fordist production to lower-cost locations outside of the United States (i.e. skilled works in the newly industrialized countries, and unskilled assembly works in the developed countries)” (Knudsen 374). In the developed countries, higher skill level jobs were created. Engineers with advanced education degrees were needed to design robots, adapt them to specific industries, direct their use, and also to oversee production in the developed countries. They filled the new demand for higher paying jobs in the auto industry. A large number of factories were moved overseas to developing countries to cut down on production costs of smaller car parts needed for the assembly process. This created many jobs in these countries, helping out their economies. These overwhelmingly positive aspects of robotics led to the shift in production techniques across the world.

IV. Negative Effects

Despite the positive changes to the automobile industry during the 1970s and 1980s, there were some negative effects, caused primarily by the US auto manufacturers’ hesitation to implement the new technology. Most were felt outside of the manufacturing plant, creating financial problems on a familial and a national level. Although new jobs were ultimately created during this switch, the downturn in demand and production and the eventual turnover of jobs left many unskilled workers in the manufacturing plants unemployed. This was a major problem in the United States and by the early 1980s, the United States automobile industry was suffering.

The pressure Japan placed on the global market competition led the United States into poor planning strategies that led to this widespread unemployment and financial crises. The general situation is discussed in an article about the auto crisis. It states; "...literally hundreds of thousands of people have lost their jobs; communities dependent on the industry have suffered devastating losses in employment and financial resources; all the domestic producers have suffered major financial losses; large facilities have permanently closed" (Abernathy 10).

Various factors contribute to the state of the economy in the 1980s, but global market competition was the most important factor. The shift to technology, which went over with little flaws ten years earlier in Japan, put a large amount of pressure on the United States. It was the country that started out on top. Why were they falling behind?

An explanation for the increasing unemployment levels in the United States can be linked to Japan's newfound success in the automobile industry. Japan was flourishing, according to a Japanese Robotics Article, and this was one of the causes for the United States' problem. "At the end of 1982, Japan's robot population was triple that of the United States and Japan's robot producers seemed positioned to dominate this strategic new industry. Underlying this early success was an elaborate set of government policies..." (Lynn 16). The overall success of the Japanese economy and automobile industry placed a great pressure on the United States to catch up to the Japanese production level. In order to do this, the West needed to shift to efficient, robotic, production techniques. The pressure to make this transition in a short amount of time led to poor planning on the part of the United States. They lacked the "elaborate set of government policies" that created a smooth transition in Japan, causing massive unemployment for lower class, skilled laborers.

Politics were inevitably involved in the high turnover rates of automobile manufacturing plants that left many unemployed. Most of the assembly line workers in the United States were part of a union. When they switched to robotics that required specialized technicians, the current workers expressed interest in advancing their skills to remain employed. Companies saw the switch as a way to escape the rigorous demands of union workers. They had two main motivations to fire current workers instead of retrain them. This is discussed in the Post-Fordism article. “The desire to reduce the union’s presence on the shop floor and the attempt to gradually purge from the workforce those workers with ‘memory’ of a unionized employment relation, to reduce the risk of future unionization of jobs outside the bargaining unit [motivated the companies]” (Gertler 427) The automobile companies took a selfish perspective on the restructuring of the industry. They favored new workers over the old, reliable workers who counted on the money to support their families. They were motivated by the decrease in labor costs that occurred from the introduction of robots. This shows how politics and self-interest can ruin what could be an easy transition into a new style of production. Workers left their old jobs on bad terms, which could have influenced their decision when purchasing a new car. This could indirectly hurt the automobile industry, because they could lose a whole market of potential buyers. Additionally, the robots that replaced the labor cannot purchase the automobiles they helped build. They have no sense of loyalty to their company, since they are not real people. As a result of this, the economy suffers because there are not as many loyal employees to purchase the cars that are being sold.

Another negative economic impact of the use of robotics is in the social security system. In 1981, the government declared a social security crisis. “As conditions in the U.S. economy worsened in the late 1970s (inflation) and the early 1980s (recession with high unemployment),

increasingly strong political and economic interests became invested in defining Society Security as a system facing crisis” (Estes 447). Essentially, the system was in trouble because there were not enough workers paying into the system and there was an increasing number of retirees drawing from the system. Part of this problem was a result of the automation of the automotive industry. When manufacturing plants switched to robots, they inevitably had to cut back on the number of workers. If in the past, there were five workers assembling doors on cars then there were five salaries, each of which put money towards the social security pool. When the robots took over, only one technician was needed to oversee the robot. Now, only one salary is putting money towards the social security pool, but those four other individuals will still need social security. As a result of this, the amount of money available for social security decreases. Baby boomers are reaching retirement age and need social security benefits. Any drop in the labor market contributes to this upcoming crisis. The combinations of these negative effects make the questioning of this technological advancement legitimate. Are the robots really better than manual labor?

VI. Conclusion

Overall, the restructuring of the automobile industry through the use of robotics has led to many positive and negative changes to countries across the world. Developing countries have benefited from the relocation of factories. Developed countries have suffered from the switch in labor and the decrease in employee loyalty, but fortunately, in the three decades since the introduction of robotics, the automobile industry has adjusted. Families have found alternative jobs, and the financial crisis has decreased for the most part. People across the world have benefited from the safer cars that the more efficient and precise robots build. The safety issue

alone is reason one cannot deny that the restructuring of the industry has brought some good to the world. As life continues onwards, and the long-range economic fallout becomes more apparent, the exact nature of the effects created by this shift can be decided.

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