**Impact of Technologies on Lackawanna County and Its Workforce**

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**Abstract**

The largest industries in Lackawanna County are adopting technologies that either replace or reduced the need for workers.  The practice of adopting technologies that removes the need for workers is currently having, and will have, several negative impacts on Lackawanna County's workforce and its economy.  From a large increase in unemployed residents to a reduction in tax revenue, the county's economy and its workforce while will be dramatically impacted.

It is the responsibility of public leaders, through strong and effective public policy, to aggressively address the challenges posed by technology adoption.  By creating and leveraging effective public policies, both the county's workforce and industries can thrive and reach their own goals.

*Keywords:* Technology Adoption, Industry, Workforce, Public Policy, Lackawanna County

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## Introduction

Organizations in all over the world have the goal to continually increase profits, reduce operating costs, and create better quality products and services for their customers.  That is also true in Lackawanna County and the northeastern Pennsylvania region as a whole.

In Lackawanna County, companies are facing mounting competition from both domestic and international competitors.  Because of this challenge, coupled with the goal to always increase profits, companies in the county have been a dramatically increasing their adoption of automation and various other technologies across almost all industries.  Most of these technologies are directly responsible for diminishing the need for, or replacing entirely, the number of human employees that were once required to perform many tasks.  The main industries in the county, like logistics, manufacturing, and retail, are some of the hardest hit.

Companies have always pursued trying to increase their revenue.  One factor that causes this is that operating and other costs always increase.  Thus, increasing revenue helps to cover those costs increases overall financial health.

The industrial revolution really kickstarted the priority to minimize manually labor.  However, advancements in semiconductors in the 90's and continued advancements in technology has only exacerbated the issue of companies replacing workers with technology.

The main parties involved in this issue are local companies in Lackawanna County and employees.  Companies have their goal of overcoming challenges and increasing profits.  Employees goals are to have jobs that can support themselves, their families, and help stimulate

the local economy.  Issues arise when companies' priorities are leveraging technology to increase efficiency and profits and not employees.

The paper reviews the main industries in Lackawanna County's that technology is impacting.  It then looks at the specific technologies that each industry is adopting and how those technology is diminishing the need for workers in that specific industry and the county as a whole.  The paper discusses the negative economic impacts to the county that are caused by employees being replace by technology.

## Literature Review

The challenges facing businesses are ever growing.  Almost all businesses are confronted with mounting costs, increased competition, and employee shortages.  Much like most areas of the country, industries in Lackawanna County are vigorously looking to either adopt or continue to expand their use of technology and automation in order to reduce costs and increase their competitiveness.  Although both of these objectives are logical, many times it is employees that are the ones at the losing end of such efforts.

As the adoption of such technologies increase, it is the employees, their families, and their communities that are negatively impacted as jobs are lost to advancing technology.  Once good paying jobs that supported families, throughout Lackawanna County, are slowing disappearing as they are being replacing by automation, artificial intelligence, robots, and various other technologies.

In the pursuit of organizational success, companies can forget about the power and advantages of employees in their businesses.  For the long-term success of companies and the

communities where they reside, it is critical to find the appropriate balance between technology adoption and the human element in business.

The fourth largest industry in Lackawanna County is its manufacturing sector. From its founding, the area was built on the coal industry and manufactures that created goods that were then sent all over the world. Currently, industrial parks from Jessup to Taylor employ over 10,000 people (2018) and provide good paying jobs that can support families and stimulate the local economy.

Some of the largest manufactures include Gentex, General Dynamics, Gertrude Hawks Chocolates Inc., The AZEK Company, and many more. Unfortunately, those jobs are diminishing every year. The industry's rapid adoption of automation and various technologies, intended to combat various challenges facing these industries, continues to take a ways jobs from hard working people.

One of the most impactful technologies that has revolutionized the manufacturing industry are robots and robotic technologies. Manufacturers find several benefits to leveraging robots in their facilities. Increasing efficiency is the main benefit manufacturers find with using robots. They find that there is a reduction in human error that can cause product defects (Stronghold Data, 2023).

Companies also find that robotic automation reduces production costs by streamlining production processes. Robots complete tasks faster which reduces cycle time. This all can make robots more appealing than their human counterparts. Also, as artificial intelligence technologies emerge, manufacturers, like other industries, are sure to adopt these technologies in various aspects in their plants.

Although newer artificial intelligence technologies will be the most impactful technological advancement we have ever experienced in our lifetime. This technology will not only help create products at a cheaper cost, but it also completely removing the need for human workers.

Gentex, one of the largest employers in Lackawanna County, builds various equipment for the United States military. The company opened its location in Carbondale, PA back in 1958 are a prime example of a manufacturer leveraging robots over human employees in their factory.

A report on Gentex explained that the company was reshoring its factories from Mexico and China and bring them back to the states. That might be a sign of hope for some. However, those jobs will be given not to human employees but to robots.

In regards to the benefits of robots, Gentex's Chief Financial officer stated that robots can operate in a much cleaner way (Sedgwich, 2017). He stressed that it is a key element when building the most technologically advance mirrors for military vehicles where the smallest smudge can render the mirror inoperable.

Gentex's location in Carbondale, at its peak, employed over 500 employees. Today, the workforce is down to just above 400 employees at is this location with robots and automation taking over many of those roles (buzzfile.com, 2023). To reduce costs and ensure quality, Gentex is opting to use robots over hiring employees, which would have provided jobs and stimulated local economies.

Another large well-paying manufacturer in Scranton, PA that builds ammunition shells for the military is General Dynamics. The company first built its facility in Scranton in 1953 and at its highest level, had upwards of over 400 workers at its facility. However, the company

announced that it would continue to lay off employees in 2014 and some of those positions were replaced by robots (Falchek, 2020).

Most recently, it was reported that the Scranton location is down to 230 workers. A recent WNEP News story aired that toured the facility. During the tour, it was specifically reported the robots play a significance roll in the plant. What used to be done by employees, robots are now performing production tasks in the creation of the shells. Particularly, robots have made a big impact on duties pertaining to the high heat needed to forge metal into cylinders, which are the shells for the munitions (Harrison, 2023).

In addition to robots, General Dynamics also embracing artificial intelligence technologies. The company announced a contract of over $146.5 million where it would be leveraging artificial intelligence to update and consolidate current IT help desks for the United States Navy (Daigle, 2021).

Even though artificial intelligence is an emerging technology, General Dynamics is already harnessing its power to take over roles currently performed by humans. Given time, robotics and artificial intelligence technology will continue to take away positions from their human counterparts.

Lackawanna County and surrounding counties have experienced a large growth in logistics and warehousing facilities in recent years and it is one of the county's principle industries (Greater Scranton Chamber of Commerce, 2023). The main driver of this growth is primarily due to the region's proximity to interstate 80 and 81 and the northeast corridor.

Large companies like Chewy and Amazon have built sprawling warehouses in Lackawanna County to service the region and employ hundreds of workers. Trucking companies

like Kane and McLane have large hubs in Lackawanna County that service the countless manufacturers and warehouses in the area and provide high paying jobs.

The Pennsylvania Department of Transportation is continuously looking at ways to widen roads and better leverage the northeast extension of the turnpike to alleviate all of the traffic, that is in part due to the growing logistics and warehouse industries. Despite the sectors booming business, they still look to leverage technology and automation which will reduce jobs for current and future employees.

One of the oldest and largest logistics company in the area is Kane Logistics. Kane Logistics has several very large warehouses and truck fleets. However, last year Kane Logistics was sold to ID Logistics which is a global logistics company headquartered out of France (Kane Logistics, 2022).

ID Logistics is aggressively adopting robotics in all of its facilities. In a recent press release on November 8, 2023, ID Logistic promoted their use, and expansion, of robots in a program called "Roboost". In the release, the company states that it has deployed almost 500 in its sites so far.

ID Logistics' Six Axes robot handles all aspects of palletizing breaking down of packages. ID Logistics states, "This robot has 6 axes of rotation ensuring total flexibility of movement, and therefore adaptability to all warehouse configurations. The packages are gripped by a suction device, thus maintaining the integrity of the packages. The Six Axes robot is suitable for the assembly of homogeneous pallets and can handle parcels of up to 6 kg. Due to its specialization, the robot processes up to 2,000 parcels per hour and is particularly suitable for consumer activities (2023)".

Teams of employees used to be needed to ready pallets, retrieve packages, stack the pallets, and prepare them for deliver.  This one robot alone has taken away dozens of jobs that were formerly done by humans.  That means dozens of less jobs available at one signal facility.

The company promotes that robot prevents strenuousness, prevents musculoskeletal disorders, reduces accidents, and improves well-being at work.  What the really means is humans are no longer doing these jobs so humans cannot get hurt.  Even though they present it as they are protecting humans, they really are taking way their jobs.

Chewy, a national online pet supply company, opened a facility in Jessup, PA back in the beginning of 2020.  The company employs about 1,000 employees at its fulfilment center in the Valley View Industrial Park.

Local community leaders, along with the state's governor, praised the jobs that the company was bringing to the county.  The hope and excitement at the time was certainly high, but it looks like it might be short lived.

Earlier this year, Chewy's CFO told The Wall Street Journal that the company was looking to leverage automated fulfillment in an effort to reduce the companies labor costs (PYMNTS.com, 2023). While limited information on the systems is shared, it was reported that the technologies employ automated storage, retrieval, and sorting systems.  As promised, shortly after the announcement the company started to lay off workers and close fulfillment centers as automation started to replace employees.

The company announced it was closing its fulfillment center just a couple hours away in Mechanicsburg, PA this past March.  It was stated that the newer facility would house more of the companies automated technologies that fall in line with their cost savings efforts announced

earlier in the year (Urie, 2023).  The company says the purpose of this automation will not just be a cost saving measure.

Chewy claims one of the main benefits of its automation adoption is that it will improve worker safety (Cosgrove, 2020).  They also mention it will help with delivery speed and minimizing product damaged during fulfillment and delivery.  This is another example of a company spinning its efforts to leverage automation, a cost saving measure, as a way to make employees safer.

Lackawanna county is home to countless trucking companies.  Those trucking companies range from local trucking companies like Bolus Freight Systems, Inc. to large national enterprises like ESTES who have terminals in Lackawanna County.

As was highlighted during the pandemic, trucking jobs are critically important to moving products, goods, and supplies all over the country.  Lackawanna County, and the country as a whole, relies heavily on trucks to make our lives and economy work.  Furthermore, truck driving jobs pay above average wages which are critical to families and businesses in the county.

The average tractor and trailer driver in Pennsylvania earn about $65,000 per year (Talent.com, 2023).  The median household income in Lackawanna County is below that at $57,736 per year (Point2, 2023).  Unfortunately, this industry is not spared from companies' frantic efforts to reduces costs.

Researchers now say that automated technology or self-driving trucks may start to replace trucker drives as soon as 2027 (Baral, 2023).  Already, Budweiser successfully delivered 50,000 cans of beer in Colorado last year via self-driving trucks.

To further understand the ramifications this technology can have on the country, a recent study causes panic through-out the truck driving profession.  The study, conducted by the University of Michigan and Carnegie Mellow University found that self-driving trucks could replace 90 percent of long-haul drivers in the United States (Quint, 2022).

This same study found that self-driving technology could cut fuel consumption by as much at 10 percent and reduce accidents caused by driver fatigue.  At best, it was also reported that another possible use of self-driving trucks is a practice called platooning.  The current version of this practice is when a human driver is in the lead truck while human drivers in subsequent trucks follow close by to leverage the reduction in air drag which helps improve fuel economy.

The future version of platooning involves a human driver in the lead truck while self-driving trucks, connecting by software, follow behind (Mani, 2023).  Although slightly less impactful, this technology would still dramatically reduce the need for truck drivers.   If the finding in these studies turn out to be accurate, this could devastate one of the largest occupations in the county and severely impact the county's economy.

 The second largest industry in Lackawanna County is retail.  This sector employs thousands of workers that service every community in the county.  The unique characteristic of this industry is that it employs everyone from teenagers all the way to those beyond the retirement age.

Retail is also an industry where people with other full-time jobs can work part-time to supplement their income, students can work while in school, or it can be a main job for others. The industry plays a critical role for both employees and customers as it provides the products

that almost everyone needs to live their lives. Clothes, food, and medicine are all purchased at retail stores. It is also an industry that is becoming hard hit by automation and self-service technologies.

A technology that is hard for anyone to miss while shopping are the self-service check-out lanes at almost every store, regardless of its size. From the beginning of retail and up until just a few years ago, a cashier was responsible for ringing up items and bagging them for customers. Today, a majority of check-out lines at retail stores are the automated self-service lines.

When local Walmart's stores first introduced the automated self-service lines in the county, it started with one or two lanes. Today, despite many people's dismay, almost half of the of the check-out lines are the automated self-service lines.

The technology in these lines are rather complex. The machines have automated voice prompts to guide customers to enter their rewards card, scan coupons, donate to causes, and guide them through various payment options. There are sensors in the bagging area to ensure all items are scanned an accounted for. There are cameras above the lines, as well as at ankle level, to ensure items under the cart are not forgotten about.

Walmart continues to advance the technology around these lines and is current launching new machines. In the next upgrades, scanning devices will all be handheld and no longer build into the conveyer. Once the item is scanned, the picture of the item itself will be displayed on the screen, along with the items cost.

Theses machines will also be able to tell if the tags on items have been switched to prevent shoplifters from putting the tags from lower priced items on more expensive items

(Bradford, 2023). This advanced technology has removed the need for cashiers in many stores while further reducing shoplifting that has dramatically increase with the roll-out of self-service lines. Instead, stores have a signal employee available to help customers who are having difficulties.

The use of these machines is not exclusive to Walmart. Countless other local stores from grocery stores like Giant Food Stores and Weis Markets to pharmacies like CVS all have self-service lines in their stores. A single machine has replaced multiple cashiers and multiple baggers. Because of this, stores have been able to reduced their operating costs while stripping jobs from the communities they serve.

A new series of technologies that is negatively impacting retail jobs can be found right here on Marywood University's campus. A serious of technologies is found in a single store which is the Amazon Go store.

The Amazon Go store, located in the Nazareth Student Center, is the only university not just in the county, but the entire state to use was Amazons calls the Just Walk Out technology. In fact, there are currently only 22 Amazon Go locations in the entire United States (ScrapeHero, 2023).

Marywood University explains this technology as, "Just Walk Out technology and Amazon One is made possible by artificial intelligence like computer vision and deep learning techniques, including generative artificial intelligence, to accurately determine who took what in any retail environment. Amazon built synthetic datasets to mimic millions of realistic shopping scenarios as well as photorealistic synthetic palm images to ensure accuracy in any environment" (Marywood.edu, 2023).

Marywood University and its students are proud to have such exclusive, cutting edge technology on its campus. Through that lens, it is an accomplishment that shows the university is able to lead on the adoption of technology and innovation. Through the lens of growing jobs and stimulating the local economy, the Amazon Go store doesn't do anything to help either effort.

The reason for this is the store only needs someone to stock it. There are no jobs for cashiers, customer services employees, or management. It misses an opportunity to employ people from the community or even students on campus. In addition, Amazon isn't based in the state, let alone the county. So, the money generated, nor its presence, will not help the local economy in any way.

The retail sector, in general, is projected to get hit hard by the advancement in artificial intelligence, machine learning and automation. A McKinsey & Company study shows that over 52 percent of all retail activities can be automated with technology that currently exists (Simon et al., 2020). Those findings are alarming considering how large of an industry retail is in the county.

Artificial intelligence is going to have the biggest impact on the industry. One area that heavily uses this technology is demand planning and forecasting (Roul, 2023). Once a job done by teams of professionals, artificial intelligence will be able to analyze data and accurately forecast demand and plans the store's inventory according. This technology will also be able to personalize marketing.

Artificial intelligence is able to leverage the persons historical data, in real-time, and target them for custom marketing campaigns and promotions to further improve the customers experience. Artificial intelligence will also help in-store operations.

AI-driven smart shelves and video analytics are able to help retail stores better understand their shopper's behavior, along with que management, replenishing stocks, the placement of products, and improving store layout. In addition, artificial intelligence is able to analyze market data to adjust product pricing so stores can increase revenue and maximize profit margins in real-time.

Manufacturing and logistics aren't the only sectors losing jobs to automation. Retail is adopting many automation technologies that are taking jobs away from employees. Most of those impacted are already disenfranchised groups.

A report by Cornerstone Capital Group, an investment advisory firm, found that approximately 6 to 7.5 million retail jobs will be automated out of existence in the next few years (Peterson, 2017). The report pointed out that retail cashiers, of whom 73 percent are women, will be the impacted the most but retails adoption of automation. Considering that retail is the second largest industry in Lackawanna County, local women will be hit the hardest.

The Cornerstone Capital Group also found that job losses in this sector will disproportionately impact that working poor. The reason for this is that most retail works are hourly and live below the poverty line. This will have far reaching implications within not just Lackawanna County, but the country.

Healthcare plays a critical role in Lackawanna County by not only ensuring good health of the region, but it also employs more people than any other industry in county. The county

hosts large organizations like Geisinger Health System, Commonwealth Health, and Lehigh Valley Health Network, along with countless small and independent healthcare providers.

The county's healthcare industry, as of 2021, employees almost 18,000 people alone (DATA USA, 2021).  It is almost impossible for anyone in the area to not personally know a nurse, doctor, medical assistant, or other medical professional.  It is the most economically impactful industry in the region that helps provide financial stability to countless families and tax revenue to municipalities in the county.

Although less assuming that some in industries like manufacturing and retail, advanced technologies are diminishing the need for some positions within the healthcare sector.  One area of healthcare that is hit particularly hard is medical coding and billing.  This career is a crucial one that ensures that healthcare providers get paid for the services they administer, while ensuring insurance companies and patients are billed for the correct amounts for those services.

As with many other positions, automation and artificial intelligence technologies are able to perform almost all of the work-related tasks that human coding and billing specialist can do. Artificial intelligence has algorithms that have the ability to review medical records and the assign the correct billing codes (medicalbillersandcoders.com, 2023). This is done by machine learning and natural language processing.

Artificial intelligence backed technology is able to integrate with existing billing systems, which makes its adoption much easier and less expensive.  Companies that offer such technologies stated that it helps streamline process, reduces associated errors, helps prevent fraudulent billing, and helps reduce operating expenses (MediCodioInc., 2023).  The reference

made to reducing operating expenses comes from no longer needing to train coding and billing specialists because the technology removes the need to human workers.

Another area within the healthcare sector being hit by artificial intelligence is transcribers. However, it is important to mention that transcribers also work in journalism, media, academic research, law, and many other areas.

The transcriber profession plays in important role in the medical field as it helps promote communication between medical staff and facilities. It also helps maintain patient medical history to allow for improve treatment plan development and proper diagnosis.

Companies like Rev, have created speech-to-text transcription software that has removed the need for most transcribers. Rev states that their technology, powered by their proprietary artificial intelligence driven automatic speech recognition technology, has many benefits over human transcribers (Sanford, 2023). The company's website states that their artificial intelligence transcription is fast as it can transcribe large documents like live lectures or podcasts in about five minutes.

Rev states that their cost is about $0.25 per minute, comparted to about $1.25 per minute with human transcribing. In addition, the company states that companies can integrate their technology into websites or other software that the company is currently using. The quick speed, lower cost, and ease of integration make this very appealing to businesses large or small which only exacerbates the problem of replacing human employees with these technologies.

Another medical career being impacted by artificial intelligence and machine learning is radiology. Although artificial intelligence and machine learning cannot yet do every aspect of a radiologist job, it is diminishing the need for the amount of radiologist. Current technology is

able to leverage machine learning to learn pattern recognition to diagnose patients. Through machine learning, it learns intelligent algorithms that are able to complete tasks by learning patters and can identify symptoms of various cancers by evaluating medical scans (Intelerad, 2022).

Further removing the need for as many radiologist, artificial intelligence can assist in discovering, monitoring, and quickly register genomic markers which reduces radiologists' workloads. As artificial intelligence and machine learning continues to advance, it will only further reduce the number of radiologists needed in the field.

Other healthcare careers that are effective by technology are medical schedulers and patient services representatives. Artificial intelligence scheduling can handle the complexity of medical scheduling. By continuous learning and leveraging algorithms, over time it can actually learn an individual providers preference. It is stated that it helps improve both patient care and staff satisfaction (Jonas, 2023).

Artificial intelligence technology is also able to do many of the patient services job duties. Artificial intelligence technologies are able to provide 24/7 support to patients. Chatbots are able to respond to patient message into doctors, monitor patient health conditions, and help increase patient and doctor engagement thorough artificial intelligence algorithms. All of these duties were once done solely by human employees.

**Analysis**


Throughout the research conducted on industries and companies within the county, and their eagerness to replace workers with technology, common themes were found on how technology adoption impacts businesses, workers, and the county as a whole. Each theme serves the companies interest while having negative implications for workers and the county's economy.

This first and most impactful theme found in this research is the negative impacts that artificial intelligence and machine learning has on the county's workforce. In short, many in the workforce are losing their jobs to various technologies. These workers are losing their jobs to technologies that they simply cannot compete with.

Considering this issue through the lens of the Elite Theory, a proposed solution using this theory would not be for the masses. Instead, the management of this issue would, instead, be one that benefits the leaders of the county. This would include county leaders and business leaders as well.

The elite theory is not compatible with a solution to help workers losing their jobs to technology. In fact, members of the elite, business leaders, would most likely make decisions that increase the use of technology. The reason for this is that continued technology adoption will save their companies money. If allowed, they will only exacerbate the implementation of technology and increase the number of workers who are replaced by it.

Evaluating this issue through the lens of the Incremental Theory, a solution would be almost impossible. Incremental Theory functions in a way that there would only be small or limited changes or additions to current policies.

The problem with leveraging the Incremental Theory in this situation is that currently, there are no current policies in place to address workers being replaced by technologies. Thus, there are not any policies to minimally build on or tweak. This theory is not bold enough to fully address the issue and combat its negative impacts on the workforce.

The next theory that could be applied to the challenge of workers being replaced by technology is Group Theory. Since Group Theory focuses on group struggle, the group in this situation is the workforce as a whole.

Group Theory could certainly be leveraged to address this issue. Policies, under this theory, could be created to specifically address the group being impacted. In this situation, it would be workers. For example, policies could be created that force or give benefits to companies that hire workers rather than adopting various technologies.

The are a few requirements needed for Group Theory to be successful. First, the workforce within the county must be able to coalesce around the cause. This is extremely important as the group must be united. Another important requirement is to have quality leadership. The leaders of this group must be strong and have the ability to aggressively and effectively negotiate. Finally, it would be important that the cause is funded properly. Robust funding will be needed to finance various initiatives.

Another theory that might be useful in resolving the challenge of technology adoption over workers is System Theory. The thought is that policy is politician's response to

environmental needs. One component of System Theory is how the political system allocates values onto the entire society.

When trying to deal with these challenges, it is important that the political system recognizes how detrimental technology can be to workers in the county.  It is also important that they understand that our values should be focused on, and included, workers interest over companies' profits. Without out those items, this theory cannot be leveraged properly.

If leveraged properly, the political system can promote workers interests.  They can help the public understand the negative impacts that job loss would have on our area.  More importantly, they can create policies that are in line with values that focus on workers interests.

Another theme that arose from the research is the how most industries in the county are adopting various technologies.  Industries from healthcare to logistics are adopting technology to increase revenue and be more competitive in a globalized economy.  This comes as companies face growing competition from foreign countries that have lower labor costs and less regulations.

Considering this theme through the prism of the Elite Theory, it is safe to assume that politicians and business leaders would certainly promote policies friendly to technology.  This would ensure that businesses could expand on the competitive edge that some technologies provide.  To reiterate, the main reason for companies adopting technologies is to reduce operating costs and increase revenue.

Politicians would be tempted to create policies that promote technologies as it would help them get political support from business leaders.  Some of the biggest donors in politics are companies.  If politicians create technology friendly policies, or simply don't create policies

against technologies for the sake of workers interests, this could garner additional support from business leaders.

Group Theory could be leveraged to support businesses efforts to adopt technology. The business community is already a powerful group within Lackawanna County. They contribute millions of dollars in tax revenue to the county. The business community also contributes hundreds of thousands of dollars to local political races.

In this case, the business community would be the group. As discussed prior, one crucial component of the Group Theory is that the group must have effective and strong leadership. The group has that component in the form of well-educated and experienced CEO's and presidents. This group already has strong leaders. In addition, they also have outside organizations like the Greater Scranton Chamber of Commerce whose main purpose is to promote and advocate on businesses behalf.

Another important component of Group Theory is that the group needs to be well-funded. There is no question that there are more resources available to companies, especially as a cohesive unit, than there is to most workers. This is crucial in advocating for their own interests.

The incremental theory could be helpful to motivate businesses to choose workers over their increased use of technology adoption. Incremental Theory's core understand is there are small or limited changes/additions to current policies. With that understanding in mind, Lackawanna County currently offers several different incentives for business to move or expand within the county.

The various programs to incentivize business range from grant programs to fee waiver programs. With incrementalism, small changes could be added to eligibility requirements for

such programs to require them to have a certain amount of functions of their business to be completed by workers rather than technologies. This could help motivate these businesses and industries to prioritize workers over technology.

The issue of county industries increasing their efforts to adopt technologies could possibly be curbed from evaluating this practice through the prism of Rational-choice Theory. This theory uses microeconomic principles to help understand an issue and weight the value within a society. After looking at alternative policies, politicians will choose the option that is best for society.

The principles of this theme could certainly be beneficial. The negative impact on workers in the county will be very large. Businesses will see the benefits of technology adoption but more and more workers will lose their jobs.

It will be important that the economic review of this situation highlights how workers are currently losing jobs, and will continue to do so to technology. Politicians must fully understand how many workers will lose their jobs and how that job loss will ultimately impact the counties economy.

Focusing on that point brings us to the final theme that emerged from this research. That theme is the negative impact that workers losing their jobs to technology will have on the county itself. The negative impacts include higher unemployment rates, local businesses effected as less workers have an income to spend, jobs being permanently removed from the workforce, and the loss in tax revenue that county will experience as workers are unemployed.

As was explained when discussing the theme of workers losing their jobs, incrementalism could also benefit companies and help incentivize them to keep workers. Adding worker

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stipulations to the eligibility requirements for county business programs will help workers. However, it will also will help businesses by save money on taxes and fees while helping offset the costs associated with employing workers.

This issue through the lens of Group Theory would make the county, its residents, and the businesses within it a group. The impacts on workers has been discussed. But, as workers lose jobs to the technologies that businesses adopt, it will ultimately affect the business themselves. As workers lose their jobs, workers will have less money to buy the company's products. This is why county leaders, the workforce, and businesses in the county must work together to find a solution to this problem.

Rational- choice Theory will be helpful as options are reviewed. Understanding the microeconomic situation in Lackawanna County as a whole will be crucial. As politician's review various solutions, it will be important that they have a solution presented that considers all negative impacts that the county will experience.

 Elite Theory will most likely not be the best theory to leverage with this issue. If the elite of the county only focus on their short-term interests and profits, the choices that they make will affect workers and ultimately, themselves. Only so many workers can be retrained to handle the technologies that replaced them. Ultimately, technology would replace most workers and no solution can fully resolve that catastrophe.

## Ethical Implications

The challenges facing the county's workforce and economy, due to companies adopting technologies, is far and wide. It is critical that resolutions are found to reduce any impact on the

county and its workforce.  If no effective policies are implemented, there are ethical implications to the labor force and Lackawanna County's economy.

One of the main ethical implications, if not resolved, is the negative impact the adoption of various technologies will have on the workforce.  Workers, in almost all sectors, will lose their jobs and livelihoods as they continue to be replaced by technology.  The lose of jobs will impact workers both financially and psychologically.

Another ethical implication pertains to the families of the workers who lose jobs due to the adoption of technology.  Not only are the financial impacts of job loss felt by the worker themselves, but it is also felt by their families who depend on that income.  If not resolved, households throughout the county will experience financial hardships.

A larger scale ethical implication is the negative impact job loss will have on Lackawanna County's economy.  As unemployment rates climb in the county due to technology adoption, this will be a loss in tax revenue.  This means there will be less revenue available to fund services, projects, and other county expenses.

In addition, higher unemployment will ultimately impact businesses within the county.  As people lose their jobs, there will be less income to spend at stores and on services in the county.  This could, and will, snowball into a county-wide financial crisis.

Ultimately, many businesses who replaced their workers with technology will be contribute to their own demise.  As workers are replaced with the technologies that these company adopted, these businesses are essentially removing income that could be spend on the products or services that the company provides.

It is the duty and responsibility of public leaders to address these implications with robust and effective policies. If they do not, companies will continue to choose technology over workers. Thus, workers and the county as a whole will lose.

## Policy Recommendations

Lackawanna County's biggest challenges can and have been resolved using solid policies. This is also true for the challenges it faces by automation and artificial intelligence. In order to address the issues caused by the technology adoption in Lackawanna County, it is critical that strategic polices are created.

Regardless of the technology that was discussed in this research, one key issue is that jobs are being lost due to its adoption. Although this is benefit to the companies employing the technologies, it is certainly a loss to the employees that are being replaced by them. This job loss is impacting not just the workers themselves, but it is also impacting their families and Lackawanna County's economy.

The first policy proposal that would address this issue to provide training dollars to workers who have lost their jobs due to any variation of technology adoption. These workers will need to be retrained in a profession that can either manage the technologies that replaced them or train for a new profession that will not be impacted but such technologies.

This policy would be very similar the benefits provided under the Trade Adjustment Assistance Program TAA benefits. This program provides training dollars to worker whose jobs were lost to, or hours have been reduced as a result of, increased imports. Typically, this comes in the form of employees losing jobs due to their company moving positions offshore.

It is critical that we help those who lose their jobs to technology to acquire new skills that can help them obtain new employment. If not, the unemployment rates will dramatically increase. Additionally, this will further drain the county's support services and strain the economy.

Another policy proposal is specific to current and future technologies impacting truck drivers and logistics fleets. The technology around driverless trucks are advancing dramatically. Also, this industry helps drive the county's economy forward.

This industry is the backbone of Lackawanna County's economy and the backbone of many blue-collar county residents. This profession is one of the most common careers for high school educated men. Also, trucker drivers are one of the highest paid professions for people that do not hold a college degree. Many times, these individuals can make more that those who do have a college degree.

Because of the amount of trucking companies in the county and the number of workers the industry employs, the policy proposal would be to create a law or rule that would prevent the trucking industry from allowing driverless trucks on the road. This could be done by passing laws legislatively and/or an executive order sent to the Department of Transport.

The impacts would be so large that such a bold move would be the only way to prevent such and economic disaster. If laws can be created to prevent motor less vehicles from being allowed on interstates, laws can be created to keep driverless trucks off of roads. This is the only way to ensure such a critical profession endures.

The final policy proposal will help motivate employers to hire people rather than adopt worker diminishing technologies. This proposal would be to provide tax credits to employers

who replace technologies with human workers.  The truth is that many companies have already replace workers with technology.  This policy would encourage those companies to go back to human workers which would help reduce the county's unemployment rate and stimulate the local economy.

 This proposal would be similar to that of the Disabled Tax Credit that provides businesses a tax credit to help meet ADA requirements needed to employ disabled people.  Also, it is similar to the Work Opportunity Tax Credit which provides help to employers who hire workers from specific targeted groups.

Strong and effective policies must be created to combat the challenges arising from companies within the county from initially adopting, or further adopting, technologies that replace human workers.  Workers and the county itself will benefit from ensuring that workers are the prime choice for all businesses.

**Summary**

The purpose of this study was to understand what technologies are replacing human workers in Lackawanna County and how that is effective both its workforce and the county itself.  The research focused on the leading industries within Lackawanna County and the specific technologies that each are adopting that directly replace, or minimize the need for real human workers.

This paper starts off with discussing the reasons why companies find the need to adopt technologies that ultimately replace workers.  This is important to understand as there are valid issues that businesses are experiencing.

After the review of business challenges, the literary review starts off with discussing the county's manufacturing sector which is the fourth largest industry in the county. It points out some of the largest manufacturers within the county and the technologies each are adopting.

Robotics and artificial intelligence are some of the main technologies that the biggest manufactures in the county are implementing. It then discusses how these technologies are directly responsible for the loss of jobs to workers. It also points out specific businesses that are reducing their workforce because of the technology adoption.

The next industry discussed is Lackawanna County's fastest growing industry of logistics and warehousing. The reasons for this industries growth are also mentioned. The research points out the main logistics and warehousing companies in the county.

The paper discusses the technologies that some of the largest logistics and warehousing companies are adopting in their facilities locally. Manufacturing, robotics, along with automation, are some of the main technologies being adopted. The benefits these companies are experiencing from these technologies are explained.

The research explains specifics on how these technologies are replacing workers within local companies. It discusses real examples of how local companies have replaced workers with these specific technologies. Also discussed are reported plans that these companies have to expand future technology adoption that will impact the need for workers.

The next industry reviewed is trucking. This is another large industry in the county that employers many people. Some of the main trucking companies are evaluated.

The research discusses the importance of this industry for both the county and its workforce. The pay for workers in this industry is above the median household income for

Lackawanna County.  This industry is important to many workers who do not hold a college degree as the pay exceeds many occupations the require a degree.

The main technology that this industry is adopting is automated driving, self-driving trucks, and platooning.  There are several benefits to this technology as it reduces the need and cost for drivers.  The technology also helps save fuel, which is a big expense for trucking companies.

The research discusses data that estimates technologies impacts on the need for truck drivers.  A study has found that these technologies will reduce the need for long-haul truckers buy as much as 90 percent.  The impacts of on the economy from such changes are mentioned.

The research then discusses the county's second largest industry of retail.  The uniqueness of this industry and its economic importance is explained.  The technologies being adopted in the county's largest retailers range from automated self-services lines to artificial intelligence technology that can forecast and re-order products.

The research shows that this industry will be one of the hardest impacted by technology adoption.  It references studies that show the county and its retail workers will be hit hard in terms of workers losing their jobs to various technologies.

The final industry reviewed is the healthcare industry.  This is the largest industry in the county.  It hires the most workers and is responsible for the health of every resident in the county and beyond.

The research reviews several occupations, like radiology and coding, within healthcare and the technologies that will impact those roles.  Specific technologies such as automation and

artificial intelligence are reviewed. It then explains how those technologies directly take jobs

away from workers.  Possible economic impacts from this loss are also discussed.

The paper then analyzes common themes found during the research through the lens of

several public policy theories.  The main themes found are workers losing their jobs, leading

industries eagerness to adopt additional technologies, and the negative economic impacts that

will occur within Lackawanna County.  Each them is evaluated using different public policy

theories and how well each would do to combat the challenges being faced.

The next section discussed the ethical implications facing the county and its workforce if

these challenges are not resolved.  Workers, and the families that depend on them, will

experience several financial crises if the solutions to the challenges are not found.  The county's

finances will also experience severe financial distress if workers continue to lose their jobs to

technology.

The final section of the paper reviews potential policy recommendations to solve these

challenges.  Recommendations include training funds to retrain employees replaced by

technology, passing laws preventing self-driving trucks, and policies that incentivize companies

to choose workers over technology are offered.

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