NAVIGATING THE DIGITAL LANDSCAPE: UNDERSTANDING THE RISKS OF TECHNOLOGY INTEGRATION FOR FACTORY WORKERS.

A Qualitative Research Study
Presented to
The Faculty of
Munting Ilog Integrated National High School
Munting Ilog, Silang, Cavite

In Partial Fulfillment
Of the Requirements for the subject
Practical Research I

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Bañas, Shanelle P.
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Abstract

While many factory workers worry about the technologies that they use in their workplace. Understanding how these factory workers maintain their passion, professional growth and their safety. However, research on the factors behind their safety inside the factory is limited. The main objective of this qualitative study was to explore the experiences and stories of every factory worker in Cavite. Data were generated from in-depth semi structured interviews and analyzed through thematic analysis. The analysis revealed that the factory workers experienced risk with handling technologies in their workplace. First, factory workers accidentally cut his/her fingers because of big machines. Second, they experienced a lot of mental risk such as headache, eyestrain, and stress. Third, they experienced fear using technology because of having trauma and emotional stress. The findings suggest that Risk management should be aware to give warnings, lectures and proper training about every technology that they are using. Also, factory workers should be aware of their basic needs and every action they commit. Furthermore, the factory/company should foster care and trust in factory workers and actively support their works and should develop and maintain good and happy relationships.

Keywords: professional growth, risk management, passion, risk, headache

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CHAPTER I

THE PROBLEM AND ITS BACKGROUND

This chapter presents the background of the study, the statement of the problem, the scope and delimitation the significance of the study, and the definition of terms used.

Introduction

Integration of technology in manufacturing works is an ambivalent that brings both opportunities and risks. On the other hand, it looks into the complex relationship between technological advancement and the well-being of the factory workers in the modern manufacturing environment. It raises concern about job security and performance, while it also improved the manufacturers by making works easier.

Background of the Study

With the world adapting so fast in modernization many places adapt to it by using technologies. Along with its integration it brings many benefits but it also comes with many risks. Chernobyl nuclear power plant explosion, this accident involves the explosion of a nuclear power plant because of the failure of one worker (Apanasyuk & Skorobogatov, 2024). Technology can be vulnerable to malfunction if not handled properly. A study of Sanders, et al. (2024) provided information that there are 72 robot-related accidents form 2015-2022; of these, 54 involved stationary robots, resulting in 66 injuries, mainly

finger amputations and fractures to the head and torso. Mobile robots caused 23 accidents, leading to 27 injuries, mainly fractures to legs and feet.

Technological risk for factory workers originated from many things aiming/involving improvement or modernization. Lack of knowledge for factory workers further enhance the risk of technology. Hardware failures can also make a part for it, this can cause accidents; based on Train Disaster in Philippines (n.d.), Fabrica train crash (1954) a timber train carrying more than 100 passengers derailed and multiple wagons fell of the bridge of the village of Fabrica in Sagay, Negros Occidental resulting to 82 casualties. This prove that technology is not the only source of accidents, sometimes it was cause by human's lack of knowledge.

A study of Gomez (2019) said that many workers lack experience or not fitted for the job. This may cause an accident because of inexperience workers facing new technologies. Workers need to be trained so that they will not create an accident themselves. A result of a study of Philippine Statistics Authority (2024); a total of 27,636 cases of occupational injuries was recorded across the industries and regions in 2021.

In addition to enhancing safety protocols, the findings of this study offer valuable insights into optimizing operational efficiency in factories in Cavite. The study will help factories to prevent any

accidents. Helping factory workers to know what they should do and those they should not. This study also helps factories improve their security. Knowing the risk of technology in factories will increase the production rate of workers while reducing their work load.

Statement of the Problem

This study aims to identify the risk of technological integration of factory workers in Cavite.

Specifically, to answer the following questions:

1. What kinds of technology are integrated by factory workers in Cavite?
2. What are the risk factors of technology integration that affects the factory workers in Cavite?
3. How do technological changes affect the skills and trainings of the factory workers in Cavite?
4. What are the strategies implemented to prevent the risks of technology integrated for factory workers in Cavite?

Scope and Delimitation

This study will focus only on the risk associated with technology for 24 factory workers engaged in manufacturing work within eight

different factories in the Cavite area. The participants will only consist of 24 factory workers working in factories around Cavite.

This study will not focus entirely on the opportunities for technology integration for factory workers in manufacturing work. The participants of this study exclude factory workers employed outside the Cavite area. Also, factory worker whose company does not integrate technology in the work will not be included.

Significance of the Study

This study will lessen the risks of technology integration among factory workers.

Specifically, it will benefit the following:

Factory Workers. This study will help the factory workers by increasing their risk awareness, and further enhancing the safety protocols inside the factory. Factory workers will become more knowledgeable about the possible risk/hazard inside the factory leading to reduction of hazards.

Factories. This study will benefit the factories around Cavite to lessen the accidents for factories and this study represent for the factories to gain awareness so they can limit their expenses and manage their safety and also this study will contribute to factories by helping them to identify risk so that they can provide preventive measures increasing the overall job safety. This study will also provide the

factories the risk so that they can improve the production even further. With the new technology, workers will have more roles inside the factory providing job to unemployed.

Risk Management. Handling task can be pretty exhausting and it can potential be highly unsafe from an ergonomic viewpoint since workers handle it manually. It can cause awkward muscle movements, strains, and excessive forces that may result in an injury. So, an analysis was conducted by the U.S. National Institute for Occupational Safety and Health (NIOSH). They created machines that help them to classify risk and prevent it. The "Decision Tree" models have the potential to predict the risk level with close to 99.35% accuracy and help workers to lessen the risk.

Future Researchers. Future researchers can build upon the findings of this study, refining its methodologies, expanding its scope, and exploring new dimensions of the impact of technology on factory worker safety and well-being. By doing so, they can contribute to advancing the field and developing more effective strategies for mitigating risks associated with technological advancements in industrial settings.

Definition of Terms

To facilitate the understanding of this study, the following are with this definition to understand and clarify the terms used in the study.

Factory - It is a station where factors reside and trade. A building or set of buildings with facilities for manufacturing. (Merriam-Webster, 2025)

Factory worker - It is a workman in a mill or factory. (Vocabulary.com 2025)

Manufacturing - It is something made from raw materials by hand or by machinery. The process of making wares by hand or by machinery especially when carried on systematically with division of labor. A productive industry using mechanical power and machinery. (Merriam-Webster, 2025.)

Risk -It is the possibility of loss or injury. Someone or something that creates or suggests a hazard. (Merriam-Webster, 2025.)

Technology - It is the practical application of knowledge especially in a particular area. A capability given by the practical application of knowledge (Merriam-Webster, 2025).

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter presents the relevant literature and studies that the researchers considered in strengthening the claim and importance of the present study.

Related Literature

Foreign

Technology used in Manufacturing Industries

Technology in industry has evolved in many ways and now it has its different uses like in business. Technology in business is a growing necessity. As the years go by, the business world is leaning more and more toward it, making it almost impossible to separate the two from each other. Priya (2020) said that technology in business has many uses. It enhances the production rate, increase the efficiency of system and improve the service. As stated by Ehichoya (2023) said that business without technology is like adventuring to a city without a map, it is easy to get lost without technology and without it, bussiness will waste a lot of time. Technology in business has different roles, from increasing the quality and productivity of one industry to enhancing the service of each industry. Business now cannot really grow without technology, because technology serve as a pillar for each industry, guiding its growth to its service.

Technology is transforming how business operates across nearly every industry, including manufacturing. Technology in manufacturing

is one of the important roles of technology because it is one of the main sources of technology distributed across the world and it is the main source of product that people use in daily life. Technology in manufacturing industry is an important innovation that is made in the world, first it makes the production process faster than normal, it increases the quality of each product, lastly it is cost efficient (What is Manufacturing Technology, n.d.). Manufacturing technology provides several advantages, including predictive maintenance, which helps identify potential equipment issues before they lead to breakdowns, improving uptime and efficiency (The importance of Technology, n.d.). It also enhances safety through remote work options and real-time data access, while boosting operational flexibility and innovation with tools like AR and digital twins, enabling more efficient design and problem-solving. These technologies drive better decision-making and greater control over operations, fostering increased innovation and competitive advantage.

Technology in business and manufacturing is almost the same, but it does not guarantee the safety of workers. Chubb (n.d.) stated that this are the technology used by workers in their workplace to ensure their safety; Drones, Sensor technology, Work zone intrusion detection, Proximity devices, Lone worker monitoring and Computer vision and camera analytics with artificial intelligence. From The Impact of Technology on Worker Safety (2023), it is said that even with these technologies it cannot prevent an accident made by human errors. Even

with many technologies used by human it is better to prevent any hazard than face it, that way workers will have safety.

Benefits of Technology Integration in Manufacturing Industries

With manufacturing technology, there are various benefits that improve a production facility with ease. Manufacturing technologies really help all companies and employees and gives benefits like increasing the quality, quality enhancement is by far one of the main beneficial components of manufacturing technology (Planettogether, n.d.). With production software, humans are needed less in all aspects of production planning and scheduling, as well as the actual production process itself. Automation in the creation of schedules and production line means an optimized schedule that reduced the number of inefficiencies, defects, and other mishaps. Technologies can increase the quality of product, using machinery reduces the number of manufacturing errors and ensures a more consistent product overall. The capabilities of advanced manufacturing technologies allow for an even more precise manufacturing process (American Micro Industries, 2024). Sokolova (2025) said that companies with manufacturing technologies can increased manufacturing efficiency, smart manufacturing eliminates the possibility of human errors that require rework and extra time. Also, it allows for delivering more output per unit of time like additive manufacturing reduces time and costs for prototyping, which helps create the developed product faster. All these

factors promote higher efficiency of the production process, more reasonable utilization of resources, and increase in productivity.

Additionally, workplace safety has always been a priority. Technologies such as automation, robotics, artificial intelligence, and wearable devices are transforming workplaces across various industries, enhancing productivity, efficiency and they also introduce safety improvements. Sokolova (2025) discussed that manufacturing technologies is not only for enhancing products quality, Solovoka said that technologies can increase safety in workplace, digital transformation takes the safety of daily operations in the manufacturing environment to a new level. Forecasting minimizes human errors, and ensure compliance with safety regulations like artificial intelligence helps predict potential risks on the factory floor by historical and real-time data. Augmented reality and virtual reality contribute to more effective personnel training. IoT and sensors monitor the state of the manufacturing equipment, environmental conditions, the state of workers health, which helps timely detect anomalies and prevent their negative impact. Onomondo (2024) stated that manufacturing technologies can improve safety in every workplace, technologies can help to ensure a safer working environment in the manufacturing industry. Technologies in manufacturing monitoring can detect condition and status of some things like detecting gas leakages by monitoring the level of harmful emissions in the environment, helping to prevent unsafe working conditions, and reduce

the number of accidents in the facility. Technologies can identify the potential risks and develop appropriate safety measures (American Micro Industries, 2024). Delegating those jobs to machines frees workers up to focus on other parts of the operation and prevents serious.

Moreover, by embracing technology, manufacturers are not only for improving quality and for decision making but also for reducing and predicting the pricing and cost. By the used of technologies it can help to expand the range of what can be produced pricing of every product and can lessen the expensive things because some things are already on the technologies (NI Business Info, n.d.). Along with asset and inventory management, predictive maintenance enables companies to eliminate possible issues and avoid unforeseen expenses associated with sudden repairs (Onomondo, 2024). Cost reduction is one of the key goals of manufacturing technology. This is because of the correction of inefficiencies and waste being reduced within the production process, which saves a drastic amount of money in the long run (Planettogether, n.d.). Manufacturing technologies improve overall productivity, which increases profit immensely as well. Even though digital transformation requires investments, Solovoka (2025) said that it will contribute to cost savings in the long run. Thanks to reducing waste and inefficiencies, increased productivity, more efficient resource utilization, effective risk forecasting and management, and making informed decisions,

manufacturing companies reduce extra expenditures and increase profitability.

Therefore, in today's business environment, technology has made it easier than ever for companies to customize their products, services, and overall operations. Technologies on manufacturing are contributing for easier customization, while traditional manufacturing leans more towards mass production, advanced technology manufacturing makes it easier to keep up with custom orders because advanced machinery is computer-based, it can easily reprogram them any time manufacturer need a new part made (American Micro Industries, 2024). The longer the production process is the more it is going to cost. Manufacturing technologies drive the production process and get products out in a much more efficient manner (Planettogether, n.d.). This is all thanks to machines automating the process, in which production time is drastically reduced between product batches, ultimately allowing for the manufacturing operation to increase profits. In addition, using machines to automate the production process means that factories have a consistent run rate for production that can be used to more accurately predict when courier can deliver your goods.

Risks of Technology Integration in Manufacturing Industries

A report from SINTEF analyzed the applications and dangers of metal additive manufacturing (AM) within Norway's oil and gas sector (SINTEF, 2025). The document, named "Use of AM Metal Parts on the

NCSA Risk Perspective," detailed obstacles to adopting AM because of insufficient industry standards for materials and components, which impeded the development of material safety data sheets. The report was informed by a survey of industry operators that received funding from the Norwegian Ocean Industry Authority (Havtil). Despite the difficulties, it anticipated a rise in AM usage as the technology advanced (SINTEF, 2025). It emphasized the advantages of AM and underscored the importance of standardization and education.

Numerous manufacturing plants continued to operate outdated machinery that did not include contemporary cybersecurity measures. This rendered them vulnerable to assailant (The Manufacturer, n.d.). The security framework was frequently intricate and distributed, which complicated the ability to uphold uniform security throughout the organization. Additionally, there was insufficient cybersecurity awareness and training for staff, resulting in human mistakes that jeopardized networks (The Manufacturer, n.d.). Moreover, manufacturing firms possessed inadequate supply chain security, as attackers could exploit partners to gain network access.

Various risks needed to be considered, and ethical guidelines were set for the responsible use of AI (FRONTLINE PBS, Official, 2019). Key risks involved job loss from automation, prejudice and discrimination stemming from societal biases in training datasets, and privacy and security concerns arising from the requirement for personal data (FRONTLINE PBS, Official, 2019). It also discussed the generation

of misinformation, moral challenges associated with autonomous weapons, and unexpected outcomes from rapid AI advancement, raising worries about future impacts.

The swift progression of AI and its impact on numerous fields such as job automation, medical diagnostics, and military activities indicated the growing public fascination and worry regarding AI's effects, fueled by prominent individuals such as Musk. "Do You Trust This Computer?" (Archive Tube, 2018) explored the advantages and risks of artificial intelligence. The text highlighted Elon Musk's recommendation to view the movie, emphasizing the importance of grasping AI's impact on human life. The movie explored the swift progress of AI and its impact on diverse fields, such as job automation, healthcare diagnostics, and military functions (Archive Tube, 2018). It likewise mirrored the increasing public curiosity and worry regarding AI's consequences, spurred by prominent individuals such as Musk.

The impact of technology trends on legal risk management within the manufacturing industry was examined (yhernandez@foley.com, 2024). It emphasized the necessity of a wide perspective on the ecosystem to tackle the challenges posed by emerging technologies. Major highlights included the rapid advancement of technologies such as AI, automation, and data analytics within the manufacturing sector (yhernandez@foley.com, 2024). Producers needed to handle legal risks associated with these technologies, including data protection and cyber

threats. It proposed that an all-encompassing ecosystem perspective aided in recognizing and minimizing legal risks throughout the supply chain. Producers were encouraged to grasp legal consequences and formulate plans accordingly. This method helped to harmonize technological advancement and legal protection.

Strategies to Address the Risks of Technology Integration

Companies cannot function in a risk-free environment. Companies must not only manage but also conquer the challenges, Gibson (2023). Posed by economic, technological, environmental, and competitive issues. Risk management can hinder the emerging risks that will impact the protection of personal and corporate data. All those involved should take a planned, organized, and unified approach to tackling corporate cybersecurity concerns, Ho and Oh (2022), the security of each other's accounts in this wide technological world is the most delicate and strictly prohibited data that can be used anytime by everyone or anyone. Prevention is the most effective way to avoid the risk of the cybersecurity because of technology.

Though, technology is a big help especially to students who use technology to make their work easier. Despite the risks, the school specifically the students persist to embrace the educational technology. For companies the efficient technological risk management is essential for protecting important assets, adhering to industry standards, and preventing financial losses. Technology risk management is more

crucial than ever because of the rise in cyberattacks and the quick development of digital technologies (enov8, n.d.); such as phishing, and data assaults that can seriously harm the company. As the internet continues to grow, society's reliance on digital and physical systems also grows. To control the hazards that these systems present to students, owners, and the public, proper security is crucial, Welch and Cyber (2021). Furthermore, because of this the students physical, mental and safety is a concern in these attacks.

The wide spread of technology brings a deep impact on students is presented by the significant increase of automation of education. Although this is a challenging problem, these complicated concerns need certain solutions. While challenging, these complex issues need careful solutions, not to be feared. Unsurprisingly, cybersecurity tops the list of technology risks, with 82% of CAEs and I.T. audit leaders identifying it as a high-risk area (SafePaas, n.d.). In an era where cyber threats loom large and data breaches can have severe consequences. On the other hand, consider how the policies, procedures, and simple steps could help to prevent or reduce IT risks in the company (AFERM, n.d.). However, need to be familiar with all of the variations of every new technology. It ought to be allowed to talk about with technologists instead.

Among the risks that an individual faces today, including IT, cyber and AI-related challenges are one of the biggest risks that should

be addressed. The consequences are huge, one mistake and there will be a fatal consequence. The current technological vulnerability strategies are no longer effective in this evolving threat. Despite this organizations need to take a comprehensive approach that covers IT risks, cyber-crimes and compliance (Hesse, 2024). Furthermore, technology risk management will improve the capacity to react strategically as well as obtain insight into their weaknesses. Furthermore, technology risk management will improve the capacity to react strategically as well as obtain insight into their weaknesses. Businesses assess operational risk using key risk indicators and address it through tactics such as risk avoidance and strategic planning. It differs from financial, market, and strategic risks. Instances encompass system breakdowns due to budget reductions, insufficiently qualified personnel, and hazards to safety (Segal, 2024). Overseeing operational risk is crucial for maintaining business stability and achieving success.

Local

Technology use in Manufacturing Industries

In today's rapidly evolving world, businesses are presented with numerous opportunities to harness technological revolutions. Ortola (2019) stated that the pace of technological advancement creates a continuum, offering businesses the chance to capitalize on each wave of innovation. Ortola (2019) said that 45% of companies in the Philippines are already exploring technology and artificial intelligence

(AI) strategies, yet only 10% have actively implemented them. This presents a massive opportunity for the remaining 90% of companies to advance in technology adoption. Despite many businesses starting to explore new technologies, a large portion has yet to fully adopt them. This gap offers an opportunity for growth and improvement, especially for companies that are still in the early stages of implementation. Industry 4.0 and its emerging technologies are reshaping the workforce and skill requirements globally, with significant implications for the labor market. The COVID-19 pandemic has exacerbated disruptions in the job sector, especially in the Philippines, where its effects have been particularly severe. Based on Asian Development Bank (2021), the country is undergoing transformations in both employment and economic growth due to the influence of new technologies and the ongoing global health crisis. The pandemic has accelerated changes in the labor market, highlighting the importance of adapting skills to meet the demands of new technologies in the age of Industry 4.0.

The Philippine construction industry is beginning to adopt artificial intelligence technologies, but the extent and impact of this adoption vary. A review of 20 studies from 2014 to 2024, using frameworks like the Technology-Organization-Environment model and the Technology Readiness Index, found that AI adoption in the sector is driven by needs such as improved cost management, better decision-making, and higher quality standards. Santos and Jocson (n.d.)

highlighted the promising yet diverse landscape of AI integration in construction, pointing to significant advantages but also challenges that need to be addressed for wider implementation. AI adoption in the construction sector is still in its early stages, but it presents substantial potential for improving efficiency and decision-making, though challenges remain in achieving full integration. Manufacturing has proven to be one of the most resilient sectors during the pandemic, in part due to its accelerated adoption of advanced technologies. Industries like manufacturing are increasingly shifting towards technologies such as autonomous machines, 3D printing, and the Internet of Things, enabling them to meet the rising demand for complex and high-quality products (Advanced Manufacturing Technologies, 2021). These technologies have allowed manufacturing to maintain its position as a vital and adaptable sector, even amid global disruptions. The use of advanced technologies has helped the manufacturing sector not only survive but thrive during challenging times, showcasing its ability to adapt to global disruptions and meet evolving consumer demands.

The Philippine manufacturing sector is diverse, encompassing industries ranging from electronics to food processing and automotive production. The country's manufacturing industry has experienced rapid growth due to factors such as technological improvements, a skilled labor force, and favorable government policies (Fastest Growing

Manufacturing Business, 2023). This growth has allowed the Philippines to remain competitive in both domestic and international markets, further emphasizing the importance of technology in fostering economic development. The diversification and growth of the Philippine manufacturing sector highlight how technology, skilled labor, and government support are critical in maintaining the country's competitive edge in the global market. 3D printing, also known as additive manufacturing, has become a significant part of modern production processes. Despite its growing prevalence, traditional analytical models are still often used for low-cost 3D printing, which can be limiting in terms of material efficiency. Alejandrino, et al. (2020) introduced an innovative lattice infill pattern for 3D printing, which improves material efficiency, and applied machine learning to correct geometric deviations in AM models, offering more precise and efficient production methods. The introduction of new techniques like lattice infill and machine learning can make 3D printing more efficient, addressing some of the challenges faced by traditional methods and further enhancing the potential of additive manufacturing. The availability of big data has provided manufacturers with the tools needed to improve operational efficiency and decision-making. By using data technologies and business intelligence systems, manufacturers can gain valuable insights into predictive maintenance, quality control, and demand forecasting. Big data enables manufacturing businesses to optimize processes, identify patterns, and make more informed decisions, ultimately enhancing productivity and efficiency across the

sector (Optimizing Processes, n.d.). Big data offers manufacturers the ability to optimize their operations, making smarter decisions based on data-driven insights, which ultimately results in increased efficiency and productivity.

Benefits of Technology Integration in Manufacturing Industries

The video "How Has Technology Made Our Lives Easier?" by Bridge (2022) effectively communicates the powerful and multifaceted impact of technology on people's daily lives. It goes beyond a simple statement of fact by highlighting the positive aspects of technological advancement, suggesting that technology is not just a tool for efficiency, but also a source of enjoyment and improved quality of life. This optimistic view aligns with the general trend of technological advancement as a force for progress and betterment. However, it is important to note that the video focuses solely on the positive aspects of technology, neglecting to address the potential downsides and complexities associated with technological advancements. For a more comprehensive understanding of technology's impact, it would be valuable to consider potential drawbacks such as privacy concerns, digital divide issues, and ethical dilemmas surrounding artificial intelligence. Based on, "The Benefits of Technology in Education," it offers a compelling argument for the integration of technology into educational practices. While acknowledging the importance of traditional learning methods. Silva, (2022) argued that technology can be a powerful force for positive change in the way we educate children.

It effectively illustrates how technology enhances accessibility, fosters communication and collaboration, promotes personalized learning, and develops essential digital skills. Furthermore, underscores the role of technology in fostering communication, collaboration, and diversity within the classroom. Online platforms and resources allow students to connect with peers and experts from around the world, bridging geographical boundaries and promoting cultural understanding. This exposure to diverse perspectives enriches learning experiences and prepares students for a globalized world.

This video provides a comprehensive overview of the benefits of technology on human lives, emphasizing its positive influence on making life easier, more efficient, and more enjoyable. It goes beyond simply stating the benefits, providing insights into how technology works and its impact on various aspects of people daily lives (Oasis, 2020). The video's strength lies in its balanced approach, recognizing both the benefits and the potential downsides of technology. While it highlights the convenience and efficiency technology brings, it also emphasizes the importance of responsible and effective use. This responsible approach suggests that technology can be a force for good if utilized thoughtfully, a key message for viewers. However, the video's focus on the positive aspects might lead to a somewhat idealized view of technology. A more nuanced discussion could address potential drawbacks, such as the digital divide, privacy concerns, and ethical dilemmas related to emerging technologies. While the video encourages responsible use, it could further benefit from exploring these

complexities to provide a more balanced and comprehensive perspective on technology's role in people's lives. The passage emphasizes the need for genuine innovation in education, warning against treating it as a mere buzzword without substance. While the world is rapidly transforming due to technology, education needs to keep pace with these changes. The author highlights the shift towards more dynamic learning environments, facilitated by tools like mobile learning, cloud computing, and gamification. (World Remit Content Team null, 2019). These tools offer the potential for more engaging and accessible learning experiences, but simply adopting them is not enough. People must focus on creating meaningful learning experiences that are relevant to student's lives and prepare them for a future shaped by technology.

This showcases the Philippines strategic use of technology to boost its tourism industry. While tourism in the Philippines is already on the rise due to its natural beauty, cuisine, and nightlife, officials are actively seeking to attract even more visitors and increase revenue. It emphasizes that the government is employing advanced technology as a key tool to achieve these goals, suggesting a conscious effort to leverage technology for tourism growth. (Collective, 2024). This indicates a recognition of the potential of technology to enhance the tourist experience, target specific audiences, and promote sustainable practices within the tourism sector. It suggests that this technology-driven approach is proving successful, indicating a positive impact on the tourism industry. The Philippines proactive use of technology

suggests a commitment to staying competitive in the global tourism market, adapting to evolving travel trends and harnessing the power of technology to enhance the overall tourist experience. This approach has the potential to not only attract more visitors but also to create a more sustainable and enjoyable tourism ecosystem in the Philippines.

Risks of Technology Integration in Manufacturing Industries

Employees can now work from anywhere at any time because to the transformation and creation of a ubiquitous work environment brought about by information and communication technologies. However, they also experienced technology overload as a result workers experience many strains, injuries and sickness. Because of this pervasive work environment, employees are continuously inundated with requests for information and communication, resulting in technology overload. Filippi (2023) said that in many workplace workers are working with short break and in a less ventilated room, they are working for many hours while their back is bent over so after their work, they experience backpain resulting for them to skip work for days. Production workers suffer from discomfort as a result of extended uncomfortable postures and repetitive motions at work. Repetitive methods are used in the highly manual mass production of kakanin items in order to meet high demand. The risk variables for workers development of work-related musculoskeletal disorders (WMSDs) were assessed in Rapid Upper Limb Assessment (RULA) was used to assess

specific repetitive activity postures in order to assess the ergonomic concerns. RULA assessed that fresh lumpia, empanadas, and kutsinta/piche-piche have a risk level of 5–6, indicating the need for ergonomic interventions, while cassava cake has a risk level of seven. (Roxas and Micah, 2021). Employees who produce kakanin frequently engage in repetitive tasks that require awkward postures, which can cause discomfort and increase the risk of musculoskeletal diseases (WMSDs). WMSDs can affect an employee's health and well-being by causing pain, stiffness, and movement limits.

Since IoT transformed data transfer, knowledge management in businesses has changed as well. This study is on how the Internet of Things facilitates real-time data exchange and how it might improve business operations and knowledge management in a variety of local firms (Sangalang, 2024). Employees become less productive when they are uncomfortable using new tools, training on new technologies can be expensive and need investment, and slow adoption of new technology can affect productivity. The nature of occupations and how people work are predicted to alter as a result of the fourth industrial revolution (4IR). One of its most notable characteristics is task automation, which is made feasible by impressive developments in advanced robotics, artificial intelligence, and computing technology. Automation has the potential to boost labor productivity, but it also has the potential to displace humans whose primary tasks are mechanized. The economic sector, age, gender, income, educational attainment, organizational

type, employment type, and administrative region are the eight factors used in this fact-finding to map Philippine workers at varying levels of automation risk (Francisco, et al., 2019). displacement of personnel operating machines as a result of businesses' increased reliance on technology to increase production speed.

In the Philippine legal system, the problem of occupational health and safety is frequently disregarded, if not undervalued. Despite the fact that the right to a safe and healthy workplace is regarded as one of the fundamental rights of workers, employees have been prevented from fully exercising this right due to a lack of enforcement mechanisms and a lack of policy talks on the subject (Bunag, 2024). Its main focus is enforcement, specifically employer accountability when the Philippine Labor Law's occupational safety rules are broken. By examining the responsibilities of an employer under the Philippine Labor Law and the repercussions of employer liability for noncompliance, it investigates the possibility of imposing civil and criminal liabilities for the breach of these standards. (Angat, 2019). Regular risk assessments are necessary to detect possible workplace hazards. Employers must be held more accountable for violating occupational safety regulations and subject to the proper penalties. The absence of targeted policy discussions on occupational health and safety impedes the creation of all-encompassing solutions and successful tactics.

Strategies to Address the Risks of Technology Integration

The education system has undergone a paradigm shift from where it used to stand years ago. With regards to the blog of childhope.org.ph (2021) the olden days, students had to go to the library and open big books to find the information they needed. In the 20th century, one would find thousands of results for the same things they need—in just a fraction of a second. The technology has truly improved, and continues to evolve. Computers, laptops, smartphones, tablets—these devices have become a necessity in today's age. These are not merely for fun and leisure anymore. They are now being heavily used by our education sector. The technology is rapidly growing there are tons of people who need technology to access for information, communication and especially fir education.

First and foremost, with the justification of Business Inquirer, (2023) the widespread of adoption of Learning Management System, 87% of private and 67% of public higher institutions (HEIs) in the Philippines have integrated Learning Management System into their classrooms. Many educators can rely on free materials, highlighting inequality in resource availability. While, according to the blog post of AllviA Blog, (2023) it discusses the importance of fostering a positive learning environment for students. It emphasizes that educators play a crucial role in creating a supportive atmosphere that encourages student engagement and motivation. The piece outlines various strategies that teachers can implement to enhance classroom

dynamics, such as promoting open communication, establishing clear expectations, and recognizing individual student needs.

In addition, the video explores the question of whether widespread adoption of AI will lead to job losses of many Filipinos. It's the potential impact of Artificial Intelligence (AI) on Filipino jobs, that Filipinos will surely loss jobs if the AI or technology will still change in time. The same thing as One PH, (2024) discovered that 14% of the Philippines workforce is at risk being replace by the AI. Staff estimates that 36% percent of jobs in the Philippines are highly exposed to AI, with more than of those highly-exposed also rates as "highly complementary". Furthermore, Telecom Review (2024), discusses in the article that the significant expansion of Information and Communications Technology (ICT) in the Philippines and its role in the country's digital transformation. It highlights how advancements in ICT have facilitated economic growth, improved access to information, and enhanced connectivity among citizens. The piece also emphasizes the government's initiatives to foster a robust digital infrastructure, which is essential for supporting various sectors, including education, healthcare, and business.

To expand, Technological Institute of The Philippines, (n.d.) state that, AI can personalize learning experiences, provide real-time feedback, and automate administrative tasks. The article emphasizes the importance of responsible AI development and implementation to

ensure that AI benefits all students. It advocates for a balanced approach recognizing that AI is valuable to teachers and students, it can make things easier for the teaching personnel who used AI, to seek for help and information. Nevertheless, Yondu Inc, (2024), the current landscape of artificial intelligence (AI) in the Philippines is characterized by significant advancements and growing interest across various sectors. The government has recognized the potential of AI to drive economic growth and enhance public services, leading to the formulation of policies aimed at fostering innovation and investment in this field. Educational institutions are increasingly incorporating AI-related curricula, preparing a skilled workforce to meet the demands of the industry.

Related Studies

Foreign

Technology use in Manufacturing Industries

The increasing reliance on technology is reshaping industries and providing new opportunities for businesses to thrive in a rapidly evolving economy. As technology progresses, businesses are benefiting from improved efficiency, reduced physical labor, and enhanced flexibility for both employers and employees. However, these advancements also introduce challenges, such as the erosion of work-life boundaries and employee resistance, particularly with the introduction of algorithmic management systems (Griep, et al., 2021). Javaid, et al., (2022) also pointed out that the use of technology in

industry has seen a significant rise since the Industrial Revolution. This shows that while technology fosters growth and operational improvements, it also brings about complications that need to be addressed, especially in relation to employee wellbeing and management strategies.

The historical development of technology has had a profound impact on industrial processes, from the early mechanization of production to the introduction of modern automation. The industrial revolution, which began in the 1700s with mechanized production powered by water and steam, has continued to evolve, with each technological wave bringing new advancements in manufacturing. By 1969, the introduction of electronics, semi-automation, and information technology further enhanced industrial production (Maddikunta et al., 2022). Today, technologies such as automation, robotics, AI, and big data are central to modern manufacturing, driving increased efficiency, precision, and sustainability in production (Jan, et al., 2023). As seen in the study of Kozlovska, et al. (2021), maintaining resilience and sustainability in the face of these technological advancements is key to long-term success in manufacturing industries.

Technological innovations are transforming manufacturing by improving efficiency, product quality, and sustainability. Advances in cloud services, IoT, data analytics, AI, and robotics are driving a revolution in production processes. Mehta (2024) found that these

technologies help streamline operations, reduce defects, and enhance productivity while optimizing maintenance and resource management. Through automation and robotics, businesses can achieve faster production, reduce human error, and improve overall operational efficiency. As highlighted in the analysis of Sahoo and Lo (2021), smart manufacturing, along with AI and IoT, enables real-time monitoring and data-driven decision-making, leading to more efficient and cost-effective production processes. Jibhakate (2021) highlighted that with these technologies people can reduce the environmental pollution in workplace, further improving production and safety for workers.

The global reach of technology has significantly expanded business opportunities by enhancing productivity and connecting consumers with products and services. The internet has revolutionized the way businesses interact with customers, providing access to a broader audience and increasing market share. Automated processes powered by technology further boost productivity by minimizing resource use and enabling faster production and service delivery (Setiawati, 2022). In industrial settings, the introduction of advanced safety protocols, such as the use of personal protective equipment (PPE) in high-risk areas, is essential to protecting workers and reducing the risk of accidents. Supapvanich et al. (2024) emphasized the importance of educating workers about safety and ensuring proper PPE provision, as this can enhance the working environment and prevent injuries, ultimately contributing to a safer and more efficient production process.

Benefits of Technology Integration in Manufacturing Industries

As a result of technology that is driven by intelligent automation, tools can perform many operations, replacing and supplementing humans, and give some benefits (Kuppusamy and Mariappan, 2021). Predicting analytics of manufacturing work by helping to fix aberrations in a proactive manner for preventing outages and downtime.

In other words, industry promotes the development of a wide variety of technologies. These enable the advancement of production systems, making them more digital and automated. This leads to improvements in product quality and reduces cycle time, ultimately reflecting better overall company performance (Gomez, et al., 2024). Therefore, industry technologies can take various forms, such as the internet of things, cloud computing, augmented reality, big data analytics, or additive manufacturing.

Technologies are being used to simulate and model processes and products, production lines, and workstations smart factories employ modeling and simulation technologies to take advantage of real-time data to represent the physical environment of a virtual model. Modeling and simulation help to minimize costs, reduce development cycles, and improve the quality of products (Salah, et al., 2022). Allowing companies to analyze and test various scenarios without physically altering or disrupting operations. In a smart factory, these technologies enable manufacturers to create accurate virtual representations of their

entire production system, from individual machines to entire production lines.

Equally important, the manufacturing work technologies gives benefits not only for factories but also for everyone. According to Saleh, et al., (2022), Technologies helps to have a great product performance, the features that allow the product to do things that other products cannot do. (Leong, et al., 2020) reported that the performance measures are the number of standard features, number of advanced features, product resale price, number of engineering changes, and mean time between failures. This stated that benefits of technology are not only for the factory but also for everyone.

Technologies on industry especially for manufacturing work can increase sales and also boost costumer's loyalty and technology integration allows manufacturing work for smooth information sharing and communication between various system and allowed companies to react quickly to changes in the market (Omar, et al., 2024). By this people may gain some knowledge that once they buy a product, they mindset set to loyalty for being worth it of the product by the help of technology in manufacturing industries. Faster manufacturing times lead to quicker deliveries, reducing costs and improving customer satisfaction.

While digital technology is reshaping the world economy, it becomes the new driving force for economic growth. The effective

adoption of digital technologies can help reduce costs and improve the sustainability and flexibility of manufacturing industries. Manufacturing environments are continually changing because of the new technologies (Thomas, 2018). By this it can create competitive advantages like gaining knowledge, enhancing skills, supply chains and processes to create superior products at lower prices. Integration of technologies in manufacturing can affect and gives benefits especially in product quality, capital costs, labor costs and even inventory cost. Also, technology can automate workflow, with digital bots, manufacturers can process huge amounts of data to streamline ordering, procurement, appointment scheduling, and alerting (Kuppusamy and Mariappan, 2021). Technology can automate the factory floor; physical robots and cobots (collaborative robots) can perform almost any manufacturing process in a factory. The factory floor has evolved over time into dark or lights-out premises where human participation is not required. Automation and digitalization enable industries to streamline operations, reduce human error, and increase efficiency. Automated machines can perform tasks faster and more accurately than humans, which leads to better throughput and reduced operational costs.

The implementation of the technologies provides companies with a quick response to customer needs, optimizing deliveries. Cloud manufacturing and big data enable a reduction in operational costs by proactively identifying issues in machines. This is made possible by

combining these technologies with the use of smart sensors (Gomez, et al., 2024). Additive manufacturing provides competitive advantages in post-sales processes, creating new revenue streams. Additionally, technologies such as virtual reality or augmented reality offer training and information to employees, resulting in faster and more accurate task execution. Digital twin technology also accelerates the learning capability of the worker and allows cost savings by testing initial products in a virtual environment.

In fact, the adaptation of technology in industry contributes and help for modeling and simulation techniques of manufacturing system's design, implementation, testing, and control in real-time (Salah, et al., 2022). For example, technology can be used to solve manufacturing industry challenges, deal with complex systems, solve uncertain problems, and problems that cannot be solved by conventional mathematical models. Simulation can be used to facilitate the usage of all components of such systems, such as robots, information technology, manufacturing, and logistics Technologies are being used to simulate and model processes and products, production lines, and workstations. Smart factories employ modeling and simulation technologies to take advantage of real-time data to represent the physical environment of a virtual model (Salah, et al., 2022). Modeling and simulation help to minimize costs, reduce development cycles, and improve the quality of products.

Additionally, by the help of technology in manufacturing work in industry it can improve and upgrade everything inside the manufacturing work also inside and outside of the factories especially the product and time management, it can upgrade the quality (Zhang & Shang, 2022). Improved performance can also reduce waste, lower production costs, and enhance the ability to meet customer demands. Waste management, Number one issues of every factory is waste so it can be controlled by the help of technologies. Technologies can improve time management of every production and technologies enhanced competitive advantage.

Finally, the benefits of technology in industry are to help the employees to prepare to enter the 21st- century workforce. The skills of employees before compare right now are big different, so technology in industry gives benefits for employees for assisting the new culture of every manufacturing work by these employees can avoid accidents for did not know how to work on 21st century (Jackson, 2019). Workers are now expected to be proficient in digital tools, and automated system. The integration of technology into industry processes means that employees must adapt to new ways of working, and they need the right training and skills to thrive in these advanced settings. This is where the benefits of technology come in, it equips employees with the tools and training necessary to succeed in a high-tech, fast-paced workplace.

Risks of Technology Integration in Manufacturing Industries

The convergence of cybersecurity and the innovations introduced by Industry 4.0 in the industrial manufacturing industry Prinsloo, et al., (2019). It explores the novel prospects for efficiency and teamwork offered by technologies such as cloud-based design systems and offsite manufacturing tools, while also emphasizing the increasing dangers of cyber-physical assaults stemming from insufficient security provisions. The article highlights the necessity of incorporating security into the creation of new technologies, recognizing unique vulnerabilities, and promoting cooperation between research and security sectors to devise effective measures that can safeguard industrial activities in this fast-changing environment.

Within the framework of Industry 4.0, this paper explores digitalization and service-based approach in the manufacturing industry, specifically targeting machine tools. A case study revealed three advanced digital services to machine tool specialists, highlighting the dangers in implementing digital service-based approach Chavez, et al., (2023). Primary risks involve disputes over service conditions, compatibility problems with current software, insufficient connectivity, poor cost-benefit analysis, data ownership dilemmas, and difficulties in implementing simulations in practical settings. These risks were grouped according to their impact levels, showcasing the distinct capabilities and revenues of various companies. To reduce these risks, suggested measures involved evaluating connectivity using open data sets, partnering with ERP and MES providers, estimating lifecycle

expenses, creating data agreements, and performing routine follow-ups. The pulp and paper sector produces considerable waste for every ton of paper, negatively affecting both aquatic and land-based ecosystems Mandeep, (2019), wastewater presents health hazards, ranging from skin irritation to hereditary issues. Adhering to environmental regulations is difficult, requiring innovative technologies such as aerobic granulation.

It is challenging to identify a particular industrial sector that gains the most from AR Bottani and Vignali (2019). Numerous works concentrate on the manufacturing and machine tool sectors, yet most technical studies stay confined to laboratories. Additional investigation is required to create effective AR solutions in areas that have been less explored. Certain applications like assembly, maintenance, design, and training have been thoroughly examined, but other domains such as safety, ergonomics, and remote collaboration are only starting to be investigated, indicating that their potential remains largely untapped the institutional element hinders product and organizational innovation because of a lack of political commitment, inadequate public resources, inefficient frameworks, institutional stagnation, and weak oversight Pérez et. al. (2019). In Peru, innovation that is not technological boosts performance, whereas in Chile, technological innovation is crucial, supported by considerably greater R&D investments. Innovation in Latin America is associated with resources, collaboration, and information channels. To develop a more sustainable industrial sector,

Industry 4. 0 has to thoroughly assess the impact on employee health and safety Lesso, et al., (2018). It is crucial to establish preventive strategies and training aimed at continuous professional growth and safety. Employees should undergo tailored training on health and safety prior to commencing a job or following alterations in roles or equipment. With the emergence of new job types due to automation, safeguarding these workers will pose a substantial challenge. The worldwide occupational safety community must work together to tackle new risks and create international standards to protect workers. The innovation of technologies in this sector and examines how these innovations function within a complex political, economic, and social landscape Skoczkowski (2020). The EEA indicates a troubling trend regarding resource efficiency and climate action. The examination seeks to outline guidelines for political decisions by understanding diverse interests among actors, preventing duplicated efforts, and minimizing costs. The approach aligns with the mission-oriented innovation system concept, emphasizing the need for political support, coordinated strategies, and action plans for successful decarbonization. The COVID-19 pandemic caused significant disruptions in global supply chains, impacting demands and flows of goods Belhadi (2021). This analysis assessed different sector strategies, particularly in the automobile and airline industries. Findings emphasized localized sourcing and technology adoption for recovery, highlighting the need for collaboration and digital technology use for resilience.

Strategies to Address the Risks of Technology Integration

There are problems caused by the cyber security of people, especially to their card or accounts. The technical risks and the potential consequences. The particular targets of the attack include online banking and electronic commerce, Bitsadze and Benidze (2023). However, E-mail phishing is a crime where some scammers use and hack their accounts to gather data and it affects billions of individuals around the world, (Castilho, 2023). The goal of email marketing and phishing emails is to target email clicks in phishing emails to accomplish their objectives.

Ukrainian banks used various ways to address the problems including financial stability of banks. Commercial banks used various strategies to mitigate credit risks. This includes the insurance, diversification and limitation. The industry is not functioning without a risk so it is important to reduce it to be developed. This action makes the security of every account stronger and more secure, (Petyk, 2023). As for the cyber security, because of the expansion of the Internet of Things (IoT) (Soltanmohammadlou, et al., 2024). It improves these technologies capacity to record and control intricate relationships between equipment and human danger sources, supporting all levels of the risk management framework's comprehensive risk factors.

Implementing technology has become an effective solution to counter the risks that have been brought by the technology.

Soltanmohammadlou, et al., (2024) said that while investigating the use of current technological impacts to reduce various technological events. Providing an effective technology to recover from the risks by implementing radars, remote sensing and social media. All these technologies, effectively plan on and respond to, which could reduce infrastructure damage and save lives, (Krichen, et al., 2024). On the other hand, the Government Accountability Office (GAO) provides technical assistants to address the critical operators and the cyber risks.

The advances in technology will potentially bring major changes in the coming decades. The sessions highlighted the urgent need to increase scientific literacy, establishing tools that utilize technology for peace and raising diplomatic efforts to address conflicts that these new technologies could intensify were all emphasized by "Preventing Security Risks through Innovation of Technology" (2024). As for the White House it must support technological advancements that encourage responsible development and use of digital assets. The technological architecture of different digital assets has substantial implications for privacy, national security, (white house, 2022). The safety and resilience of financial systems, the ability to enforce and other national goals will help the improvement and security from the risks of the technology.

Local

Technology use in Manufacturing Industries

The Fourth Industrial Revolution (FIR) presents challenges and opportunities for emerging nations like the Philippines, which are not as prepared as industrialized countries. Analysis suggest that developing nations, due to their diverse economic environments and limited access to technological advancements, will engage with FIR differently than wealthier nations. Just as the Philippines participated in the Third Industrial Revolution distinctively, it will also interact with FIR in unique ways, influenced by its own circumstances (Torneo and Yang, 2019). This highlights the need for a tailored approach that considers the country's specific development trajectory and technological readiness.

Industries in the Philippines, including manufacturing, agriculture, transportation, and retail, have been able to maintain competitiveness through industrial automation. For example, automation in manufacturing sectors like electronics assembly helps ensure productivity despite the challenges of limited technological infrastructure. Even though the IT and BPO sectors remain dominant in export services, automation has allowed businesses in other industries to stay relevant in the global market (Magon et al., 2023). This shows that while automation has played a crucial role in maintaining competitiveness, there is still a need for more widespread technology adoption across all sectors.

The Philippines, as a developing nation in the Asia-Pacific region, has been consistently working to align its political, social, economic, and cultural policies with international standards and trends. An analysis investigating the preparedness of public and private employees for FIR found that while both sectors recognize the need for skill development, there are significant gaps in readiness and competency. The examination which used a mixed methodology and surveyed employees nationwide, highlights the challenges in equipping the workforce with the necessary skills to navigate FIR technologies (Dela and Dela, 2023). The findings emphasize the need for continuous education and training to prepare employees for the future of work in a rapidly evolving technological landscape.

The Philippine apparel industry has experienced significant growth, with a 35.9% annual increase in production value, demonstrating its potential for further expansion. However, this growth has come with challenges, particularly regarding worker health and safety. Hazardous working conditions, especially in the textile sector, underscore the need for ergonomic workstation designs to improve worker safety and productivity. This highlights a broader issue in the Philippines, where rapid industrial growth must be balanced with efforts to protect workers well-being (Saguyod, et al., 2021). As the sector expands, addressing these challenges will be crucial for sustaining growth and improving working conditions.

The rise of homeworkers in the Philippines, both in industrial settings and through online platforms, reflects significant shifts in the labor market. Industrial homeworkers, who assemble goods under subcontracting agreements, and online workers, who provide services via digital platforms, represent two distinct but growing groups in the country's workforce. While these types of work offer flexibility, they also present challenges related to job security, labor rights, and working conditions. A study of Dejardin, (2021) said that, as the Philippines increasingly embraces remote and flexible work arrangements, these concerns must be addressed to ensure that workers are protected in the digital age.

E-commerce has become a key driver of labor productivity in the Philippines, providing businesses with new opportunities for growth. Since its introduction, e-commerce has enabled companies to reach a wider audience, increased employment opportunities, and allowed Filipino consumers to shop more easily. The integration of technology into commerce has boosted productivity by allowing businesses to operate more efficiently and by enabling consumers to explore goods and services through dynamic online platforms. The impact of e-commerce on labor productivity is clear, with technology facilitating both business expansion and improved job opportunities for the workforce (Gabinete et al., 2022). As e-commerce continues to grow, its role in driving economic development will be essential for the Philippines integration into the global digital economy.

Artificial intelligence (AI) adoption is rapidly accelerating in both the public and private sectors of the Philippines. AI has the potential to revolutionize industries across business, engineering, education, healthcare, and the arts. As AI technologies continue to evolve, their integration into various sectors will play a significant role in shaping the future of the Philippine economy. However, the adoption of AI presents both opportunities and challenges, particularly regarding governance, regulation, and the implications for the workforce (Concepcion et al., 2019). Managing these challenges effectively will be essential for ensuring that AI contributes positively to the nation's development while minimizing potential risks.

In conclusion, while the Philippines has made strides in embracing new technologies, it still faces challenges in preparing its workforce for the Fourth Industrial Revolution. With the adoption of automation, AI, and e-commerce, industries have maintained competitiveness, but significant gaps in workforce readiness and worker safety remain. As the country continues to navigate these changes, tailored strategies to address its unique challenges will be necessary to maximize the benefits of FIR.

Benefits of Technology Integration in Manufacturing Industries

The pandemic exposed weaknesses in supply and value chains, prompting a greater adoption of Industry 4.0 technologies. This policy emphasizes the integration of the nation's manufacturing, agricultural,

and service production systems, aiming to create a more interconnected and efficient industrial landscape. This signifies a shift towards knowledge-based industries and the development of innovative solutions. The government is prioritizing investments and strengthening science, technology, and innovation (STI) capabilities to raise the GDP share of STI-driven sectors. The study by Cadiz et al. (2024) examines the integration of technology within Philippine Higher Education Institutions (HEIs) using a content-based bibliometric analysis.

Investigates the role of global value chains (GVCs) in supporting labor productivity and technological innovation in Philippine enterprises. The analysis by Mendoza (2024), finds that while internally generated technology is less common, Philippine GVC providers primarily rely on imported technology and knowledge from outside sources for incremental process enhancements. This suggests that while participation in GVCs brings benefits, the Philippines needs to develop stronger indigenous innovation capabilities to fully reap the rewards of global integration explore the potential of sensor technologies in propelling the Philippines manufacturing sector forward.

They argue that upskilling and retraining Filipino automation engineers and instrumentation technicians is crucial for commissioning and maintaining smart technology in manufacturing facilities. As stated

by Magon et al., (2023). This review highlights the opportunity for Filipino technology companies to create sensors through technological foresight, leading to the development of domestically produced automation solutions. These technologies hold immense potential for improving efficiency, security, and decision-making across various sectors, challenges such as regulatory requirements, skill shortages, and infrastructure limitations need to be addressed. According to Rodriguez (2024), the analysis emphasizes the need for a comprehensive approach that includes policy reforms, investment in education and training, and infrastructure development to fully harness the potential of ABCD technologies.

Risks of Technology Integration in Manufacturing Industries

The inherent vulnerabilities of the ITES sector itself pose significant risks. The rapid growth of the Information Technology Enabled Services (ITES) sector in developing nations like India, the Philippines, and Kenya presents both significant opportunities and considerable challenges. While the sector has undeniably contributed to economic growth and job creation, a critical analysis reveals the limitations of existing policy approaches, particularly in addressing value capture and long-term socio-economic transformation.

It highlights the risk that a significant portion of the profits generated by ITES operations may be repatriated by multinational corporations, leaving limited long-term benefits for the local economy.

Based on (Kleibert & Man, 2024). This necessitates a shift in policy focus, moving beyond a simple attraction model to one that actively promotes local ownership, higher-skilled jobs, and technology transfer. Moreover, policies should incentivize the establishment of domestic ITES companies and encourage the development of local expertise, ensuring that the economic gains are more equitably distributed.

The race to the bottom theory has raised questions about standardizing labor and environmental regulations across nations. There is a debate about if a race to the bottom is bad or even possible, and if corporations or nation states should play a bigger role in the regulatory process.

The Philippines faces the challenge of ensuring worker safety in environments with potential radiation exposure. A recent study of (Dean et al., 2024). Provides a critical assessment of occupational radiation exposure trends in the country over the past decade (2013-2022), offering valuable insights into the effectiveness of the national radiation protection system. It acknowledges the diverse sources of occupational radiation exposure. Workers across various sectors—from healthcare to industry—face potential exposure from planned sources, natural background radiation, and even emergency situations. It emphasizes the need for robust tracking and management systems to monitor these exposures effectively, ensuring compliance with international safety standards and minimizing health risks.

This directly assesses the efficacy of the Philippine radiation protection system. By analyzing the collected data, evaluate the adequacy of current tracking methods, protocols, and infrastructure. The comparison with internationally recognized safety requirements allows for a thorough evaluation of the system's strengths and weaknesses, identifying areas needing improvement to enhance worker protection.

The Philippines has witnessed remarkable progress in lowland rice production over the past two decades, resulting in increased productivity and improved livelihoods for many farming families. However, this success story stands in stark contrast to the relatively neglected state of upland rice farming, creating a significant disparity in the economic well-being of farming communities. As O'Bien (n.d.), notes this imbalance underscores the urgent need for increased attention and investment in upland agricultural systems. Recent years have seen a welcome increase in inquiry and development efforts focused on improving upland rice production. The benefits of improved weed management extend beyond increased rice yields. By reducing the labor-intensive nature of weed control, farmers can free up valuable time and resources to pursue other income-generating activities or attend to other essential household needs. This can lead to improved food security, increased household income, and a more equitable distribution of agricultural benefits across the country.

While the Philippines has made significant strides in lowland rice production, the persistent disparity between lowland and upland farming systems demands immediate attention. Increased investment in research and the implementation of effective weed management strategies offer a powerful means of improving the livelihoods of upland farming communities. This targeted approach promises to not only enhance productivity but also promote more equitable agricultural development across the Philippines, ensuring a more sustainable and prosperous future for all farmers

Strategies to Address the Risks of Technology Integration

The Philippine ICT industry is experiencing significant growth driven by factors like increased investment, rising consumer spending, and demand for better connectivity. The COVID-19 pandemic accelerated digitalization in both the government and private sectors, stated by Villanueva, (2023). The ICT sectors face a number of challenges such as, lack of digital literacy, shortage of ICT skilled professionals etc.

In the field of cyber security, the Philippines faces threats, including phishing attacks, ransomware and digital fraud. Dacanay, et al., (2024) indicate that Philippines is identified as vulnerable to cyberattack due to factors such as widespread internet usage, low cyber security awareness, and underdeveloped cyber security infrastructure. According to the analysis of Villanueva, (2023) it is the effects of not

having the ICT skilled that is needed in the industry, due to the development of the technology, the problems is also expanding.

Over and above that the analysis of Morales, et al., (2021), proclaimed that certain aspects of Technology Integration, such as accessibility, teacher training, available tools and equipment, and digital literacy, have not been sufficiently studied in the context of the Philippines. This particular *prode* investigates the traditions, transitions and best practices of TI by observing 85 tertiary-level teachers in STEAM fields. A five-instrument classroom observation protocol was used to gather data on how technology is integrated into teaching and how it affects learning.

To conclude, according to Reuters (2024) the financial sector, particularly in the context of digital banking, is undergoing rapid transformation. With the Bangko Sentral ng Pilipinas (BSP) lifting the moratorium on digital banks in 2024, the focus has shifted to ensuring robust risk management protocols. The BSP mandates compliance with international standards and requires digital banks to implement stringent cybersecurity measures, regular audits, and risk assessment frameworks. This approach aims to enhance financial inclusion while safeguarding the integrity of digital banking systems.

Relationship of the Previous Studies to the Present Study

Past studies on technology for factory workers share common themes. They express worries about job security as automation may change roles, and stress the need for upskilling. Health risks, including physical strain and mental stress from monitoring, are noted. A digital skills gap, especially for older workers, needs better training. Psychological effects like job insecurity and workplace changes are frequent. Privacy risks from AI surveillance and fairness in performance tracking raise ethical concerns. Technology may boost productivity but can also cause burnout and increased workloads.

The one that often the most affected by technology integration is the factory workers. The works of the factory workers frequently involve repetitive, manual tasks that can be easily automated or replaced by machines. Machines and robots can perform these tasks more efficiently and without fatigue. Automation helps businesses reduce labor costs in the long run, that's why most of the factories in society has technologies to get the work done and easily. Furthermore, previous studies on technology for factory workers share common themes. They express worries about job security as automation may change roles, and stress the need for up skilling. Health risks, including physical strain and mental stress from monitoring, are noted. A digital skills gap, especially for older workers, needs better training. Psychological effects like job insecurity and workplace changes are frequent. Privacy risks from AI surveillance and fairness in performance tracking raise ethical

concerns. Technology may boost productivity but can also cause burnout and increased workloads.

This research also emphasizes the mental and physical effects of technology on factory employees, including heightened stress from job insecurities or ergonomic problems stemming from human-machine interactions. By reviewing previous studies about this topic, readers gain insights into how technology influences employment patterns and the importance of reskilling and upskilling initiatives. Furthermore, they can investigate methods for the ethical application of technology, prioritizing worker safety, job stability, and equitable treatment. In the end, the study enables policymakers, business executives, and workers to manage the digital shift responsibly, striking a balance between productivity improvements and employee well-being.

CHAPTER III

METHODOLOGY

This chapter reveals the methods of research to be employed by the researcher in conducting the study which includes the research design, research locale, research instrument, population and sampling, data construction procedure, analysis of information, and ethical considerations.

Research Design

This study used qualitative research design. This research design explores the experiences of target respondents about certain topics, unlike quantitative that focuses on numerical data points/statistics. Qualitative research design focuses on participant's experiences, perceptions, and behavior (Tenny, et al., 2022.) The researchers used this type of design to discover the experiences of the participants on the risk of technology in their workplace.

Specifically, this study used Phenomenology. It is qualitative research approach that seeks to understand and describe the everyday experiences of participants. Phenomenology research studies lived experiences to gain deeper insight into how people understand those experiences (Delve & Limpaecher, 2022.) The researcher wanted to know the lived experiences of factory workers, using phenomenological research it will give more understanding for the researchers about the experience of factory workers about the risk of technologies.

Research Locale

This study was conducted in two municipalities in Cavite province; Dasmarinas and Silang. Dasmarinas, an urban municipality located 50 Kilometers south of Manila, the capital of the Philippines. Dasmarinas was selected as the place of study due to its high concentration of factories which make it more convenient for the researchers in finding respondents.

The study conducted in municipality of Silang. Silang is a first-class urban municipality in Cavite province, located 60 Kilometers south of Manila, the capital of the Philippines. The researchers chose Silang as the study location because they reside in the municipality, making it more convenient to find respondents. Majority of respondents coming from Silang itself, specifically from the barangay of Maguyam, Tibig, Hukay, Balite 1, Iba, and Malaking Tatyao.

Population and Sample

The population of this study was comprised of factory workers in Cavite who possessed extensive knowledge and experience regarding the risks associated with technologies, machinery, and tools in their workplaces. This definition specifically targeted individuals actively working in factories within Cavite and possessing a high level of familiarity with the technological aspects of their jobs. The focus was on those factory workers directly involved in using technology within

the company or factories, ensuring a relevant and informed perspective on the risks involved.

According to Creswell (2013,) a phenomenological study aims to describe the shared meanings individuals experience regarding a concept or phenomenon, focusing on understanding the essence of human experiences. It involves five to twenty-five participants. A sample of 24 factory workers were selected for this study. The sample included nine men and fifteen women, providing a representation of the gender distribution within the study group. Research interviews were conducted in different barangay: Tibig (eight interviewees), Hukay (two interviewees), Iba (four interviewees), Balite (six interviewees), Malaking Tatyao (three interviewees), and Paligawan (one interviewee), resulting in 24 participants within Silang, Cavite.

Sampling Technique

The researchers used a purposive sampling technique in this study. According to Nikolopoulou (2023), purposive sampling is a non-probability sampling technique in which the participants are selected because they possess characteristics crucial to the study. The researchers used this technique to gather comprehensive and relevant data, are the selected participants had experiences and insights aligned with the objectives of the study. This technique was particularly beneficial for exploring the relevance of participant's experiences in

adapting to technological changes in the workplace. Targeted expertise ensured the collection of rich and meaningful data that might not have been obtainable with other sampling methods.

Research Instrument

In this study, researchers used a semi-structured interview as a data-gathering instrument. It includes 19 open-ended questions designed to understand the risks of technologies for factory workers in Cavite. The questions cover topics related to the use of technologies in the factory workers' workplace. The first two questions address the type and name of the factory workers' workplace. The next seven questions discussed the different kinds of technologies and the risks that affect the factory workers. The following five questions focus on the strategies implemented by the company and their effectiveness. The questions aim to identify the risks of technology for factory workers and how they can reduce its impact.

Data Construction Procedure

The researchers used interviews as their primary data-gathering procedure. Interviewing is a crucial step in the data collection process, allowing both the researchers and the interviewees to exchange information. Through this method, researchers gain a deeper understanding of the data by gathering insights, experiences, and training-related information from the interviewees (Interview Tips, n.d.).

This procedure ensures that the necessary data for the research is obtained.

Before conducting the interviews, the researchers obtained approval for the consent letter from their practical research teacher. They used purposive sampling to select their desired participants. The interview process began with a short introduction to establish trust with the participants before proceeding with the interview questions. The interview consisted of nineteen (19) questions, which the interviewees answered while the researchers listen attentively.

To protect the privacy and security of the interviewees, the researchers provided and obtained signed consent forms before conducting the interviews. After gathering the data, the researchers compiled the recorded videos using Google Drive. Once all team members had completed their interviews, the compiled drive was submitted to their practical research teacher for review.

Analysis of Information

Qualitative analysis is the technique utilized for data analysis the description method, described by Ladupet and Linsday(1998) was used by the researcher convert audio (typically spoken word) in to a written form that can be used to analyze a specific phenomenon or even in this

case. The experience of the factory workers that encounter risk in technology thematic analysis is a method of analyzing qualitative data. It is usually applied to set of text such as an interviewer or transcript.

This study will start with thematic analysis according to coalfield (2019,) thematic analysis is a Robert and widely used method of analyzing qualitative data and this step to thematic. (1) Transcribing is the process of converting audio, video or notes into written text. (2) become familiar with the duty of cause reading and reading by the researchers to familiarize step. (3) Generate initial code is when you break down your qualitative data into discrete experiments and create codes to label from them step. (4)Search for themes let you indicate queries that you know your customers are looking for the next. (5) review themes this is the stage where we check the themes we're we generate accurately and relevant represent the data they are based on. (6) defined theme is the inferred stance taken on a cultural topic or message of the story. (7) Writing up, this is the stage where we check the generated data accurately and relatively to represent the data they base on. (8) Collating is the process of gathering and analyzing information from the multiple sources into a coherent data set. (9) Reviewing the codes, the process where a researcher or another qualified individual carefully examine the code assigned to qualitative data in study. (10) Revision of codes, the process of modifying refining the label or categories assigned data during qualitative analysis. As the researcher want experienced factory workers on Cavite in terms of risk

of technology, using phenomenology this will give a better execution to the researcher.

Ethical Considerations

Ethics play a vital role in research, ensuring that studies are conducted in a responsible, respectful, and trustworthy manner. By prioritizing ethics, researchers can guarantee that studies are carried out responsibly, aiming to advance knowledge for the greater good. This approach promotes trust and credibility. To achieve ethical research, informed consent is essential. Researchers must provide participants with comprehensive information about the study before they agree to join. This includes explaining the risks and benefits, as well as the study's purpose. Participants' autonomy must be respected, and their decision to decline participation should be honored.

Additionally, confidentiality is crucial to ensure participants' security. All collected data must be handled with care to protect sensitive information.

Lastly, honesty is paramount. Researchers must present accurate data, provide clear reporting of research methods, and report results truthfully. By upholding these ethical standards, researchers can maintain the integrity of their work and contribute to the advancement of knowledge.

CHAPTER IV

RESULTS AND DISCUSSION

This chapter comprises the analysis, presentation and interpretation of the findings resulting from this study. Discussions are also provided to give a comprehensive explanation of the themes that were generated in response to the objectives set in this study.

Research Findings

SOP 1. What kind of technology are integrated by factory workers in Cavite?

Factory workers in Cavite rely on various technologies to perform their tasks effectively. These include machines, computers, and tools. Machines play a crucial role in automating repetitive and hazardous tasks. A factory worker stated that "*Ginagamit ng kompanya namin ay strapping machines*." (Translation: Our Company uses strapping machines.) Another factory worker said that "*Merong bulb pushing, merong injection, merong crimping, meron ding bash and dash*." (Translation: There is bulb pushing, there is injection, there is crimping, there is also bash and dash.) Lastly, a factory worker said "*Yung machine na nagp-produce ng mga cups, at bags ng mga fast food.*" (Translation: Machines that produce cups and bags for fast-food chains.) They emphasize that most of their machines are used for packaging.

In addition to machines, some factories utilize computers to improve efficiency. A factory worker said that "*Mga computer at laptop*" (Translation: Computers and laptops). The majority of workers surveyed indicated that the technology they use is primarily for monitoring and optimizing production.

Lastly, factory workers primarily use tools to perform their jobs. One worker stated, *"Ginagamit namin, mas more kami on DIY na"* (Translation: We use more and more tools like grinders, routers because we are increasingly involved in DIY projects). This highlights that factory workers in their workplaces favor tools over machinery, such as grinders and routers. DIY tools are frequently used by manufacturers to develop their own technologies and make their work easier.

SOP 2. What are the risk factors of technology integration that affects the factory workers in Cavite?

The prolonged use of technology, such as operating machines or using control panels can cause repetitive strain injuries, and musculoskeletal disorders. Interviewees said that "*napuputol ang daliri.*" (Translation: fingers are cut off,) "*nalaglagan ng bakal.*" (Translation: metal feel in their body,) "*naputol ang buto sa kamay.*" (Translation: bone fractured) The result of it was the workplace of factory workers was affected by the new technologies. Some automated equipment may produce electromagnetic radiation, heat or noise, which can be negatively affect the worker health over time.

Most of the factory workers experiences long-term health risks like insufficient rest and long working hours that can lead to chronic fatigue. The interviewee's said that "*naaapektuhan ang health namin*" (Translation: Our health is being affected,) "*masakit po sa mata at ulo"* (Translation: My eyes and head are getting hurt,) due to the implementation of new technologies in different workplace of different kinds of factories around the Cavite. This shows that the health of factory workers is at risk.

Factory workers experience many risks in their workplace, such as emotional risks. One factory worker said, "*Nakakadagdag ng stress pag walang machine*" (Translation: It adds stress when there are no machines). This statement indicates that it is very stressful when machines are unavailable. A second factory worker expressed, "*Nakakalungkot isipin pag may isa sa aming kasamahan ay naaksidente dahil sa machine*" (Translation: It is sad to think that one of our coworkers has been involved in an accident because of machine). This suggests that it is deeply distressing when colleagues encounter accidents due to machinery. A third factory worker reiterated, "*Nakakadagdag ng stress pag walang machine*" (Translation: It adds stress when there are no machines), emphasizing that the lack of machines is indeed stressful.

In addition to emotional risks, factory workers also face physical risks. One factory worker mentioned, "*Dahil sa stress nagdudulot ito ng sakit ng ulo*" (Translation: Because of stress, it causes headaches). This indicates that stress leads to headaches. A second factory worker said, "*Dahil sa pagbababad sa computer, ito ay nagdudulot ng sakit ng ulo*" (Translation: Because of prolonged computer use, it causes headaches). This means that spending too much time in front of a screen can lead to headaches. A third factory worker stated, "*Dahil sa mga naaaksidente na mga kasamahan ko, ako ay nagkaroon ng takot*" (Translation: Because of the accidents involving my coworkers, I have developed fear). This suggests that these accidents can result in trauma.

SOP 3. How do technological changes affect the skills and trainings of the factory workers in Cavite?

The efficiency of training for factory workers is essential to ensuring workplace safety. One interviewee stated, "Using new technologies helps ensure proper understanding." This training helped workers develop their skills by allowing them to undergo hands-on practice in factories, ensuring a proper grasp of their tasks. Another interviewee said, "*Effective naman 'yun para mas lalo mo pang mapag-aralan ang computer para matuto ka.*" (Translation: That is effective because it allows you to study the computer even more, helping you learn.) This response highlights how training enhances workers' learning and skill development, enabling them to perform their tasks

more accurately and safely. Similarly, another interviewee stated, "*Yes, epektibo—talagang epektibo. Unang-una, hindi naman para sa company 'yon eh; para din sa'ming nagtatrabaho, kaya malaking pakinabang talaga siya.*" (Translation: Yes, it's really effective. First of all, it is not just for the company; it is also for us workers, making it a significant benefit.) This statement supports the importance of training, emphasizing that its benefits extend beyond company improvement to also enhancing the skills and capabilities of factory workers.

Technology has become an essential part of everyone's life, making tasks easier and faster. One interviewee mentioned, "*mas napapadali nito ang mga gawain*" (Translation: It makes the work easier), highlighting how technology has provided relief to factory workers by making their tasks more convenient and efficient. Additionally, technology plays a crucial role in production. Another interviewee stated, "*napapadali ang mga gawain at mas napapadami ang produkto ng kumpanya namin*" (Translation: It makes the work easier, and our company can produce more products). This emphasizes how technology not only simplifies work but also increases production, helping companies meet their targets without forcing workers to work overtime just to reach the designated number of products. Lastly, one interviewee shared, "*para sa akin ano mas napapadali yung paggawa... halimbawa ano may isang bagay na ano mo lang.... konting search mo lang sa technology alam mo na yung sagot"* (Translation: For me, the work can be easier... for example, you have one thing, then with just a

little search using technology, you will know the answer). This illustrates how technology enables people to quickly find information whenever they are curious about something.

SOP 4. What are the strategies implemented to prevent the risk of technology for factory workers in Cavite?

Factory workers rely on technology to perform their tasks efficiently, but prolonged exposure to certain machinery and equipment can dose serious health and safety risk. To address these concerns, factories implemented various strategies to minimize potential dangers one of the common approach is providing proper orientation and training for workers A factory worker said that *"nag tra-training kami"* (Translation: we were training). Another factory worker said that *"pinag tra-training nila kami*" (Translation: They trained us). Both emphasizing that they prevent risk with proper training. Lastly, a factory worker said that "*may orientation kami para malaman namin ang mga technology na gagamitin namin."* (Translation: we have an orientation so we can learn about the technologies we will use). They emphasize that they go through orientation so that they will team about the technologies they will use, preventing risk.

Aside from training, some factories use physical objects or materials as protective measures. To prove this one factory workers said that "*meron kaming mga signage"* (Translation: we have signages). They explain that using signage they can prevent risk imposed by

technologies. Another factory worker said that "*pinapasuot kami ng PPE*" (Translation: we are being made to wear PPE). They emphasize that using PPE they can prevent risk. Last factory worker said that "*gumagawa kami ng harang.*" (Translation: we make barricade). This explains that using barricade they reduce the risk of technologies.

Another strategies that factory use is regular maintenance of technology. A factory worker said that "*may mga technician kami upang maayos mga technology namin.*" (Translation: we have technicians to repair our technologies). This emphasize that technicians repair their technology in a certain period.

Discussion

The findings of this research highlight the significant impact and risk of the technologies in terms of using it on the factories and how it affected the factory workers. The research focused on the experience of factory workers towards using technologies in their workplace.

The implications of this research emphasize the need to address the challenges faced by factory workers towards handling big machines tools and computers. Strategies, warnings and specially proper trainings should be implemented for every factories to support factory workers for reducing and managing safely every situations with technologies. While technologies offer opportunities and easier job, it should be accompanied by proper trainings to measure its negative impacts because the findings revealed that even though technologies

can make their work easier there are always risk and significant impact on the factory and every factory workers. In other word the findings proven that there are negative effects on the factory workers skills and safety. Overall, the participants faced different challenges and risk in managing their job effectively, which resulted in accidents particularly physical and mental risk.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter presents the summary of the study, conclusions, and recommendations of the study based on the data analyzed from the previous chapter.

Summary

This study explores the research problem of types of technology used in factories, risk factors of technology, effects of technology on skills and training of factory workers, and the strategies implemented to prevent the risk of technology. This study is a qualitative phenomenological study, the researcher interviewed 24 factory workers in Cavite. Findings were analyzed using thematic analysis.

Findings on the super-ordinate themes, subordinate themes and subcategories that emerged from the analysis of data are as follows:

1. Kinds of technology Integrated by Factory workers
    1.1. Machines
    1.2. Computer
    1.3. Tools
2. Factors of technology integration that affects the factory workers
    2.1. Physical risk
    2.2. Health Risk
    2.3. Mental Risk
    2.4. Emotional Risk

3. Technological changes that affect the skills and trainings of the factory workers
   3.1. Efficiency of training
   3.2. Making task easier

4. Strategies implemented to prevent the risk of technology for factory workers
   4.1. Training and Orientation
   4.2. Materials
   4.3. Maintenance

Conclusions

Based on the gathered data—with the focus of the study that Navigating the Digital Landscape: Understanding the Risks of technology Integration for Factory Workers—the researchers, therefore conclude that:

As the continuous implementation of new technologies to different factories affected the Factory Workers around Cavite, the researchers found various effects that technology has on factory workers. This study aimed to qualitatively explore how the factory workers affected by the new and enforcement technologies in different factory workplace. Results are in connection with the research question said in the statement of the problem. The results conveyed an outcome that is comprised of four (4) categories and sixteen (16) subcategories,

all are found in research findings. Each description provided a vivid, collective explanation and insights into the effects of technology to the factory workers in Cavite.

The research revealed the risks associated with integrating technology in manufacturing, particularly for factory workers. The study uncovered a range of perspectives among workers, with the majority expressing a willingness to embrace technology's potential despite concerns about risks and uncertainty. As a result, factory workers developed a better understanding of how technology can enhance their work processes, fostering a more progressive and efficient manufacturing environment. The integration of technology led to positive outcomes, improving both manufacturing operations and the skills and capabilities of factory workers.

Recommendations

This section presents tangible and actionable recommendations based on the minor and major findings of the study, "Navigating the Digital Landscape: Understanding the Risks of Technology Integration for Factory Workers." The researcher recommends the following:

Understanding the risks associated with technology integration in factories is crucial for ensuring worker safety. This study aims to inform factory workers about potential hazards and promote safety measures within the workplace. By increasing awareness, factories can

reduce accidents, improve workplace safety, and minimize expenses related to injuries and damages.

Factories must adopt proactive measures to identify and mitigate risks associated with technology integration. Implementing preventive strategies will enhance job safety and create a safer working environment. Learning how to recognize and address these risks will help in developing effective safety protocols.

Managing risks in technologically integrated factories can be challenging and, at times, unsafe from the workers' perspective. This research provides insights that can assist management in assessing risks and developing safer machinery. By improving workplace technology and reducing risk levels, factory workers can experience a safer and more secure working environment.

This study serves as a valuable reference for future researchers seeking to explore the risks of technology integration for factory workers. It provides a foundation for expanding knowledge in this area, allowing researchers to build on existing findings, strengthen their studies, and uncover further evidence to support workplace safety improvements. By addressing these recommendations, factories can effectively navigate the challenges of technology integration while prioritizing worker safety and operational efficiency.

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APPENDIXES

APPENDIX A "Informed Consent"

Republic of the Philippines
Department of Education
REGION IV-A
DIVISION OF CAVITE PROVINCE
MUNTING ILOG INTEGRATED NATIONAL HIGH SCHOOL

Informed Consent

Dear Sir/Madam:

I hope this letter finds you in good health and high spirits. We are Grade 11 STEM students from Munting Ilog Integrated National High School. I am writing to you to seek your voluntary participation in a research study that we are conducting entitled "***Navigating the digital landscape: Understanding the Risks of Technology Integration For factory Workers***". The purpose of this study is to know the risks of technology in factory workers and to keep factory workers safe in their workplace.

Your participation in this research study is entirely voluntary, and you have the right to refuse to participate or withdraw your consent at any time without any negative consequences. Your decision to participate or decline will not affect your current or future relationship with our school or fellow researchers.

Here are some important details about the research study:

Study Procedures: If you agree to participate, you will be asked to answer our interviews and it includes 19 questions. The estimated duration of your participation will be approximately 30 minutes to one (1) hour.

Confidentiality: We will maintain strict confidentiality of all the information collected during the research study. Your data will be coded and stored securely, and only authorized researchers will have access to it. Any information published or presented will in an aggregated and anonymized form, ensuring your identity remains confidential.

Voluntary Participation: Participation in this research study is entirely voluntary. If you decide to participate, you are free to withdraw your consent or discontinue your involvement at any point without providing a reason and without any penalty or loss of benefits.

By signing below, you indicate that you have read this consent letter, understood the information provided, and voluntarily agree to participate in the research study. You also acknowledge that you have received a copy of this letter for your records.

Thank you so much for your cooperation on this study and God bless!

Sincerely,

The Researchers

Participant's Signature: _____

Participant's Name: _____

Date of Interview: _____

Purok 3, Munting Ilog, Silang, Cavite
0917-315-5152
epedcavite.muntingilognhsmain@gmail.com
DepEd Tayo Munting Ilog Integrated National High School - Cavite

APPENDIX B "Interviewee's Profile"

Republic of the Philippines
Department of Education
REGION IV-A
DIVISION OF CAVITE PROVINCE
MUNTING ILOG INTEGRATED NATIONAL HIGH SCHOOL

Interviewee's Profile

Name: _____

Age: _____

Sex: _____

Date of Birth: _____

Place of Birth: _____

Address: _____

Educational Background: _____

Current Employment: _____

Contact Information: _____

Name of the Company: _____

Years Working in the Company: _____

_____

Signature of Interviewee over Printed Name

Purok 3, Munting Ilog, Silang, Cavite
0917-315-5152
epedcavite.muntingilognhsmain@gmail.com
DepEd Tayo Munting Ilog Integrated National High School - Cavite

APPENDIX C "Interview Questions"

Republic of the Philippines
Department of Education
REGION IV-A
DIVISION OF CAVITE PROVINCE
MUNTING ILOG INTEGRATED NATIONAL HIGH SCHOOL

Interview Questions

1. What kind of the factory do you work on?

   _____

2. What is the name of the factory do you work on?

   _____

   _____

3. What are the technologies used on your company?

   _____

4. What aspect of using technology have been most challenging for you as a factory worker?

   _____

5. Do you ever feel in danger when working with technologies? What do you think when you experience that you are in danger?

   _____

   _____

6. What are some accidents that you experience when accessing or using technologies? If so, please describe your situation.

   _____

   _____

7. What are some of the obstacles you, as a factory worker, must overcome in order to use technologies in your workplace?

   _____

8. Do you ever experience fear when using technology? If yes, how did you handle that situation?

   _____

   _____

9. Does using technology affect your mental health and physical health? How does it affect you?

   _____

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10. Did your company give you training on how to use technology? If so, how long is it?

_____

_____

11. Is it effective for you and for your co-workers to go under training before using technologies?

_____

12. Does undergoing training is helpful for you to gain more experience?

_____

13. Is it really helpful to have technologies in a factory? Give some advantages of having technologies in factory.

_____

_____

14. What new skills have you had to learned or adapt due to adding technologies in your workplace?

_____

15. Does your company have strategies to prevent technological risk? What are some of it?

_____

_____

16. How does those strategies help factory workers prevent the risk of technology?

_____

_____

17. Is there a time that the strategies you prepared failed to prevent technological risk? When?

_____

_____

18. How do these strategies improve your working experience?

_____

_____

19. What do you think about the strategies that you and your factory implemented? Is it effective or not?

_____

_____

_____ _____

Name and Signature of Interviewee **Name and Signature of Interviewer**

CURRICULUM VITAE

LEANDRO G. BAGUIS

094, Matrogate Tibig, Silang, Cavite
09702420441
baguisleandro@gmail.com

CAREER OBJECTIVE

To become a mechanical engineer that has a stable income, good and peaceful life.

PERSONAL INFORMATION

Birthday	November, 17, 2007
Birthplace	Silang, Cavite
Age	17 years old
Father's Name	Cenon A. Baguis
Mother's Name	Jenepher C. Gonzaga
Nationality	Filipino
Religion	Catholic
Civil Status	Single
Language Spoken	English and Tagalog
Hobbies	Reading Gaming

EDUCATION

- ***SENIOR HIGH SCHOOL***

  Munting Ilog Integrated National High School (2024-Present)

  Munting Ilog, Silang, Cavite

  With Honors

- ***JUNIOR HIGH SCHOOL***

  Munting ilog Integrated National Highschool (2021-2024)

  Munting Ilog, Silang, Cavite

  With Honors

- ***ELEMENTARY SCHOOL***

  Tibig Elementary School (2014-2020)

  Tibig, Silang, Cavite

  With Honors

REFERENCE

Christianne Roie A. Carabeo, MACDDS
Munting Ilog Integrated NHS
Research Teacher
09171452217

Clarice C. Toledo, Teacher III
Munting Ilog Integrated NHS
Class Adviser
09542733667

Efren B. Reyes, Teacher III
Muntibg Ilog Integrated NHS
DRRR Teacher
09266966516

SKILLS

Fast Learner
Mathematical skills
Proficient In M.S. word, excel, and powerpoint
Writing
Fixing things
Logical thinking
Leadership

Leandro G. Baguis
GRADE 11- STEM STUDENT

SHANELLE P. BAÑAS

117 Loren St, Balite 1, Silang, Cavite
0993 020 3476
shanelle.banas2008@gmail.com

PERSONAL INFORMATION

Birthday	June 23, 2008
Birthplace	Silang, Cavite
Age	16 years old
Father's Name	Jovel R. Bañas
Mother's Name	Maria Heidi D. Poblete
Nationality	Filipino
Religion	Catholic
Civil Status	Single
Language Spoken	English and Tagalog
Hobbies	Reading Watching

REFERENCE

Christianne Roie A. Carabeo, MACDDS
Munting Ilog Integrated NHS
Research Teacher
09171452217

Clarice C. Toledo, Teacher III
Munting Ilog Integrated NHS
Class Adviser
09542733667

Efren B. Reyes, Teacher III
Muntibg Ilog Integrated NHS
DRRR Teacher
09266966516

CAREER OBJECTIVE

To become a nurse that has a large salary, stable income, can provide for my family, good life and peaceful life.

EDUCATION

- ***SENIOR HIGH SCHOOL***

  Munting Ilog Integrated National High School (2024-Present)
  Munting Ilog, Silang, Cavite

- ***JUNIOR HIGH SCHOOL***

  Munting ilog Integrated National Highschool (2021-2024)
  Munting Ilog, Silang, Cavite

- ***ELEMENTARY SCHOOL***

  Toclong Elementary School (2014-2020)
  Toclong 1-C, Imus, Cavite

SKILLS

Fast Learner
Memorization
Observant

Shanelle P. Bañas
GRADE 11- STEM STUDENT

LANCE PATRICK G. DE GUIA

101 Purok 3, Malaking Tatyao, Silang, Cavite
09565198294
lncdeguia@gmail.com

PERSONAL INFORMATION

Birthday	February 17, 2008
Birthplace	Silang, Cavite
Age	17 years old
Father's Name	Sonny De Guia
Mother's Name	Lealyn Gonzales
Nationality	Filipino
Religion	Catholic
Civil Status	Single
Language Spoken	English and Tagalog
Hobbies	Volleyball Dancing Watching

REFERENCE

Christianne Roie A. Carabeo, MACDDS
Munting Ilog Integrated NHS
Research Teacher
09171452217

Clarice C. Toledo, Teacher III
Munting Ilog Integrated NHS
Class Adviser
09542733667

Marielle T. Olivares
Munting Ilog Integrated NHS
Master Teacher I
09128455185

CAREER OBJECTIVE

To obtain employment as an Fashion Designer, where I can fully express my skills and uniqueness as a fashion designer and marks as determination and creativity in people's mind.

EDUCATION

- ***SENIOR HIGH SCHOOL***

  Munting Ilog Integrated National High School (2024-Present)

  Munting Ilog, Silang, Cavite

  With Honors

- ***JUNIOR HIGH SCHOOL***

  Munting ilog Integrated National Highschool (2021-2024)

  Munting Ilog, Silang, Cavite

  With High Honors

- ***ELEMENTARY SCHOOL***

  Malaking Tatyao Elementary School (2014-2020)

  Malaking Tatyao, Silang, Cavite

  With Honors

SKILLS

Creative (Dance Choreography)
Leadership
Editing
Public Speaking
Communication
Designing

Lance Patrick G. De Guia
GRADE 11- STEM STUDENT

JHOANNAH MAE M. FORMALEJO

Ibayo, Sabutan, Silang, Cavite
09307862985
Formalejojhoannah5@gmail.com

PERSONAL INFORMATION

Birthday	February 20, 2008
Birthplace	Iba, Silang, Cavite
Age	17 years old
Father's Name	Jonel C. Formalejo
Mother's Name	Gemaylin M. Formalejo
Nationality	Filipino
Religion	Catholic
Civil Status	Single
Language Spoken	English and Tagalog
Hobbies	Reading Watching movies Playing games

REFERENCE

Christianne Roie A. Carabeo, MACDDS
Munting Ilog Integrated NHS
Research Teacher
09171452217

Clarice C. Toledo, Teacher III
Munting Ilog Integrated NHS
Class Adviser
09542733667

Efren B. Reyes, Teacher III
Muntibg Ilog Integrated NHS
DRRR Teacher
09266966516

CAREER OBJECTIVE

To become a civil engineer that has a stable income and can provide financial stability to support my family.

EDUCATION

- ***SENIOR HIGH SCHOOL***

Munting Ilog Integrated National High School (2024-Present)
Munting Ilog, Silang, Cavite

- ***JUNIOR HIGH SCHOOL***

Munting ilog Integrated National Highschool (2020-2024)
Munting Ilog, Silang, Cavite

- ***ELEMENTARY SCHOOL***

Silang West Elementary School (2014-2020)
Mary Anne Village, 4118 Silang, Cavite

SKILLS

Fast Learner
Mathematical skills
Memorization

Jhoannah Mae M. Formalejo
GRADE 11- STEM STUDENT

MARK JOMARI R. LANZUELA

Alkalde street, Tibig, Silang, Cavite
09277126687
markjomarilanzuela29@gmail.com

PERSONAL INFORMATION

Birthday	December 29, 2007
Birthplace	Camarines norte
Age	17 years old
Father's Name	Joven M. Lanzuela
Mother's Name	Carina R. Lanzuela
Nationality	Filipino
Religion	Catholic
Civil Status	Single
Language Spoken	English and Tagalog
Hobbies	Billiard Basketball Singing

REFERENCE

Christianne Roie A. Carabeo, MACDDS
Munting Ilog Integrated NHS
Research Teacher
09171452217

Clarice C. Toledo, Teacher III
Munting Ilog Integrated NHS
Class Adviser
09542733667

Efren B. Reyes, Teacher III
Muntibg Ilog Integrated NHS
DRRR Teacher
09266966516

CAREER OBJECTIVE

To become a seaman and go to other countries and help my family when I achieve my goals.

EDUCATION

- ***SENIOR HIGH SCHOOL***

  Munting Ilog Integrated National High School (2024-Present)
  Munting Ilog, Silang, Cavite

- ***JUNIOR HIGH SCHOOL***

  Munting ilog Integrated National Highschool (2021-2024)
  Munting Ilog, Silang, Cavite

- ***ELEMENTARY SCHOOL***

  Tibig Elementary School (2014-2020)
  Tibig, Silang, Cavite

SKILLS

Playing billiards and basketball
Little bit good in singing
Good listener

Mark Jomari R. Lanzuela
Grade 11 - STEM STUDENT

JESSICA LIANZA

018, Purok 2, Balite 1st, Silang, Cavite
09753380346
jessicalianza17@gmail.com

CAREER OBJECTIVE

To become a nurse who is mentally and financially stable, surrounded by genuine friends, and living a peaceful, fulfilling life.

PERSONAL INFORMATION

Birthday	December 17, 2008
Birthplace	Silang, Cavite
Age	16 years old
Father's Name	Vic P. Lianza
Mother's Name	Evelyn C. Mendoza
Nationality	Filipino
Religion	Catholic
Civil Status	Single
Language Spoken	English and Tagalog
Hobbies	Reading Singing Dancing

EDUCATION

- ***SENIOR HIGH SCHOOL***

  Munting Ilog Integrated National High School (2024-Present)

  Munting Ilog, Silang, Cavite

  With Honors

- ***JUNIOR HIGH SCHOOL***

  Munting ilog Integrated National Highschool (2021-2024)

  Munting Ilog, Silang, Cavite

  With Honors

- ***ELEMENTARY SCHOOL***

  Balite 1st Elementary School (2014-2020)

  Balite 1st, Silang, Cavite

REFERENCE

Christianne Roie A. Carabeo, MACDDS
Munting Ilog Integrated NHS
Research Teacher
09171452217

Clarice C. Toledo, Teacher III
Munting Ilog Integrated NHS
Class Adviser
09542733667

Efren B. Reyes, Teacher III
Muntibg Ilog Integrated NHS
DRRR Teacher
09266966516

SKILLS

Fast Learner
Good at memorizing
Public speaking
Designing
Writing
Leadership

Jessica M. Lianza
GRADE 11 - STEM STUDENT

KYLA JEAN M. REAL

Purok 1, Paligawan, Silang, Cavite
09925963136
kylajeanreal4@gmail.com

PERSONAL INFORMATION

Birthday	March 07, 2007
Birthplace	Quezon City
Age	18 years old
Father's Name	John A. Real Jr.
Mother's Name	Margie M. Real
Nationality	Filipino
Religion	Catholic
Civil Status	Single
Language Spoken	English and Tagalog
Hobbies	Playing Volleyball Watching Sketching

REFERENCE

Christianne Roie A. Carabeo, MACDDS
Munting Ilog Integrated NHS
Research Teacher
09171452217

Clarice C. Toledo, Teacher III
Munting Ilog Integrated NHS
Class Adviser
09542733667

Efren B. Reyes, Teacher III
Muntibg Ilog Integrated NHS
DRRR Teacher
09266966516

CAREER OBJECTIVE

To obtain Architecture and Design Studio where I can fully express my skills and determination as a professional architect and marks creativity in people's mind, and to develop new skills.

EDUCATION

- ***SENIOR HIGH SCHOOL***

Munting Ilog Integrated National High School (2024-2025)

Munting Ilog, Silang, Cavite

- ***JUNIOR HIGH SCHOOL***

Emilia Ambalada Poblete Integrated National High School (2020-2023)

Camia St, Mary Ann Village, Brgy. V, Silang, Cavite

Plaridel National High School (2023-2024)

Plaridel, Lipa, Batangas

- ***ELEMENTARY SCHOOL***

Cavite National High School (2014-2020)

Camella St. Springville, Molino IV, Bacoor Cavite

SKILLS

Visual Learner
Creative
Innovating Designs
Communication
Technical Drafting

Kyla Jean M. Real
GRADE 11- STEM STUDENT

AUSTYN JHANRY H. SAMSON

kanluran St. Tibig, Silang, Cavite
09281591086
austynjhanrysamson@gmail.com

PERSONAL INFORMATION

Birthday	January 18, 2008
Birthplace	Silang, Cavite
Age	17 years old
Father's Name	Jeselyn M. Hernandez
Mother's Name	Daryl D. Samson
Nationality	Filipino
Religion	Catholic
Civil Status	Single
Language Spoken	English and Tagalog
Hobbies	Repairing things watching

REFERENCE

Christianne Roie A. Carabeo, MACDDS
Munting Ilog Integrated NHS
Research Teacher
09171452217

Clarice C. Toledo, Teacher III
Munting Ilog Integrated NHS
Class Adviser
09542733667

Efren B. Reyes, Teacher III
Muntibg Ilog Integrated NHS
DRRR Teacher
09266966516

CAREER OBJECTIVE

To become marine engineer and get a good salary to earn a lot money.

EDUCATION

- ***SENIOR HIGH SCHOOL***

  Munting Ilog Integrated National High School (2024-Present)
  Munting Ilog, Silang, Cavite

- ***JUNIOR HIGH SCHOOL***

  Munting ilog Integrated National Highschool (2021-2024)
  Munting Ilog, Silang, Cavite

- ***ELEMENTARY SCHOOL***

  Tibig Elementary School (2014-2020)
  Tibig, Silang, Cavite

SKILLS

Engine mechanic
Welding
Farming
Construction
Car painting
Building
Billiards
Racing
Singing
Leadership

Austyn Jhanry H. Samson
GRADE 11- STEM STUDENT