Exploring the Lived Experiences of Cleaning Workers in the Era of Technological Advancements: A Phenomenological Study

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Abstract

The cleaning industry is a vital component in maintaining cleanliness and hygiene across diverse sectors, yet the experiences of cleaning workers remain underexplored, particularly in the context of technological advancements. With the onset of the COVID-19 pandemic, there has been a notable acceleration in the adoption of advanced sanitation technologies within the industry (Furones & Monzón, 2023; Messina et al., 2023). Consequently, understanding the perspectives and challenges faced by cleaning workers in adapting to these technological shifts becomes even more important. This study aims to address this gap by undertaking a comprehensive exploration of the lived experiences of janitors and cleaning service employees in the context of technological shifts within the cleaning industry.

Through a phenomenological approach, this study explores the experiences of nine cleaning industry workers, the majority of whom are from lower-income backgrounds and possess limited formal education. Many of the participants are immigrants or come from immigrant families, adding layers of complexity to their experiences with technology adoption in the industry. Through the phenomenological approach, the study sought to examine the challenges, coping mechanisms, and implications of technology use from the perspective of cleaning workers. Drawing upon Work Adjustment Theory (WAT), the study investigates the unique challenges encountered by lower socioeconomic status (SES) workers in adapting to changes in their job environments specific to technology adoption. WAT serves as a valuable framework for understanding the dynamic process of adaptation to new work environments and technologies among blue-collar workers. It provides a basis for the pivotal role of socioeconomic factors in influencing the person-environment fit, emphasizing the need for targeted interventions and

support mechanisms to facilitate successful adaptation and work adjustment in dynamic work environments.

Importantly, the findings of the study revealed the challenges faced by cleaning workers in response to technological advancements. Participants expressed concerns about the effectiveness of training in preparing employees to navigate new technologies, particularly in troubleshooting technical issues. The study provides support for the necessity of short training courses tailored to individuals with limited educational backgrounds, addressing the gap between formal education and the emerging skills required for employment in the cleaning industry. Furthermore, the study sheds light on the positive relationship between technology integration and increased job satisfaction, alongside improvements in job quality. Participants highlight how technological advancements improved their efficiency, productivity, and overall satisfaction in their roles, while also reducing physical strain and improving health and safety.

Theoretical implications of the study are discussed within the framework of WAT and seek to explain the dynamic process of adaptation to new work environments amid technology changes for low-income workers. Additionally, the study identifies limitations and proposes avenues for future research, including strategies for effective knowledge transfer, understanding leadership perceptions, and examining long-term effects of technological integration on workforce dynamics and organizational practices. This study contributes to the existing body of literature by contributing a new understanding of the intersectionality of technology use, the cleaning industry, and influences of socioeconomic factors among cleaning workers. It offers insight and practical implications to inform business practices, promote equity and inclusion in training, and support the well-being of cleaning workers amidst technological advancements in the cleaning industry.

Chapter 1.0 - Introduction

1.1 Background of the Study

The cleaning industry plays a vital role in maintaining hygiene across various sectors, including healthcare facilities, educational institutions, commercial buildings, and residential properties (Karr et al., 2021). Cleaning workers, often referred to as janitors, custodians, or housekeepers, are frontline workers who perform essential tasks to ensure the cleanliness and safety of indoor environments (Chang et al., 2021). It has been previously established that the cleaning industry, and these cleaning workers, are necessities for a functioning society (Chang et al., 2021; Karr et al., 2021; Suleiman & Svendsen, 2015). With the rapid advancement of technology in recent years, the cleaning industry has witnessed significant changes in the tools, equipment, and processes used to perform essential cleaning tasks (Christensen & Limnios, 2023; Furones & Monzón, 2023; Messina et al., 2023). To that end, the events and circumstances surrounding the Covid-19 pandemic further exemplify the integral role of the cleaning industry in maintaining health and safety standards and the importance of new technology integration.

For example, it has been well-established that the COVID-19 pandemic spurred significant advancements in sanitation technology within the cleaning industry to address the heightened demand for stringent hygiene measures and infection control (Chang et al., 2021; Jose et al., 2023; Lemieux & Hupert, 2020; Messina et al., 2023). One such advancement was the widespread adoption of autonomous cleaning robots equipped with ultraviolet (UV) light or chemical disinfectants for surface decontamination (Christensen & Limnios, 2023; Messina et al., 2023). These robots are capable of autonomously navigating through indoor spaces, such as hospitals, airports, and office buildings, to disinfect high-touch surfaces effectively (Lemieux & Hupert, 2020). The deployment of such robots minimizes the risk of human exposure to infectious agents

while ensuring thorough and consistent sanitation protocols are upheld in various environments (Kumar et al., 2021).

Furthermore, amid the COVID-19 pandemic, there was a rise in the development of antimicrobial coatings and surfaces integrated into cleaning equipment and infrastructure (Jose et al., 2023; Kisla et al., 2023). These coatings, often containing silver ions or other antimicrobial agents, possess the ability to inhibit the growth and transmission of pathogens on surfaces, thereby reducing the risk of surface-mediated transmission of infectious diseases (Kisla et al., 2023; Kumar et al., 2021). Additionally, advancements in touchless cleaning technologies, such as automatic soap dispensers, touchless faucets, and self-sanitizing surfaces, have gained prominence in public facilities and high-traffic areas to minimize direct contact with potentially contaminated surfaces (Lemieux & Hupert, 2020). These innovations not only enhance the efficiency and effectiveness of cleaning procedures but also contribute to maintaining safer and more hygienic environments amid the ongoing pandemic and beyond.

The COVID-19 pandemic required a rapid implementation of advanced sanitation technologies within the cleaning industry due to the urgent need to stop the spread of the virus in a variety of high traffic and high use settings (Dantas et al., 2020). The highly contagious nature of SARS-CoV-2 and its ability to persist on surfaces for extended periods of time increased concerns regarding surface-mediated transmission, particularly in high-traffic areas and shared spaces (Kisla et al., 2023; Van Doremalen et al., 2020). As traditional cleaning methods proved insufficient to effectively combat the spread of SARS-CoV-2, the integration of innovative sanitation technologies became imperative to enhance existing cleaning protocols and enhance infection prevention measures (Jose et al., 2023). Moreover, the ongoing evolution of the COVID-19 virus, including the emergence of new variants, heightened the importance of developing

advanced sanitation technologies to adapt to public health challenges and safeguard public health (Dantas et al., 2020). Thus, the critical role of sanitation technology advances in the cleaning industry has been increasing since the COVID-19 pandemic and the need to reduce the risk of virus transmission, protecting public health, and enhancing overall sanitation practices in various settings.

That being said, although the importance of the cleaning is relatively well-known, especially since COVID-19, overall, cleaning work is often underpaid, traditionally underrated, very physically demanding, and cleaning workers are exposed to both chemicals and thermal conditions (Karr et al., 2021; Koksoy Vayisoglu & Oncu, 2021; Suleiman & Svendsen, 2015). According to Sardadvar (2020), in light of the Covid-19 pandemic, some jobs became publicly highlighted as 'essential' or 'key' work, including cleaning service employees. As a result, during the pandemic, the appreciation for these technicians was at an all-time high, but once the lockdowns ended the respect once attached to cleaning technicians started to decrease (Billings, et al., 2021).

According to Kumar (2021), even after the pandemic ended, certain cleaning service sectors, such as hotel housekeeping departments, have remained the frontline of the new normal hotel experience. For example, guests will continue to look for Hotels that are known for taking care of their health and safety through proper and systematic cleaning and sanitization procedures (Nyashanu et al., 2021). That being said, despite the widespread adoption of technology in the cleaning industry, there is limited research focusing on the lived experiences of cleaning workers in relation to technology advancements and use. Understanding the perspectives, challenges, and implications of technology use from the viewpoint of cleaning workers is essential for several reasons. Specifically, cleaning workers constitute a substantial portion of the global workforce,

and their experiences with technology can have far-reaching implications for workplace dynamics, job satisfaction, and overall well-being. Research suggests that workers' experiences with technology can influence their job attitudes, performance, and organizational commitment (Barley, 1986; Orlikowski, 1992). For example, the introduction of robotic cleaners and automated cleaning systems may change the nature of cleaning tasks and the skills required to perform them (Al-Farsi & Hassan, 2023).

Given that technology advancements in the cleaning industry have the potential to impact the quality and efficiency of cleaning operations, as well as the health and safety of cleaning workers, understanding how cleaning workers perceive and adapt to these technological changes is essential for promoting their occupational health and safety. As a result, work adjustment theory (WAT) will be applied to the current investigation. Specifically, WAT provides a valuable framework for understanding how individuals adapt to changes in their work environments (Dawis & Lofquist, 1984; Harper & Shoffner, 2004; Hesketh & Griffin, 2005). However, the application of this theory to low SES employees requires careful consideration of socioeconomic factors that may influence the person-environment fit. Research suggests that low SES employees face unique challenges in adapting to changes in their job environment due to limited access to resources and support systems. Specifically, for lower SES workers, this may involve creating a supportive work environment where they feel valued and empowered to embrace new technologies and work practices (Albizu & Estensoro, 2024). This can be achieved through effective communication, ongoing feedback, and opportunities for skill development and advancement. By addressing these challenges through targeted interventions and support mechanisms, organizations can promote the successful adaptation and work adjustment of low SES employees in dynamic work environments.

Unfortunately, technology use in the cleaning industry may exacerbate existing disparities in the workforce, particularly among low-income and marginalized cleaning workers. In workplace settings, lower socioeconomic status (SES) workers often find themselves marginalized and lacking avenues to express their experiences. This disparity stems from various factors, including limited access to positions of leadership, which are predominantly occupied by individuals from higher socioeconomic backgrounds. As a result, the voices of lower SES workers are frequently unheard and their perspectives overlooked in decision-making processes (Groshen & Holzer, 2021). However, phenomenological research, such as the current study on cleaning workers' perceptions of technology advances, offers a safe and empowering platform for this population to share their experiences. Lower SES workers face numerous barriers that hinder their ability to express themselves in workplace settings (Albizu & Estensoro, 2024). These barriers include limited educational opportunities, socioeconomic constraints, and systemic biases that perpetuate inequalities in the workplace hierarchy. Additionally, the hierarchical structure of many organizations often relegates lower SES workers to entry-level positions with limited opportunities for advancement or participation in decision-making processes (Groshen & Holzer, 2021). Consequently, their voices are often marginalized, and their experiences are disregarded in discussions surrounding workplace policies, practices, and advancements.

Furthermore, the lack of representation of lower SES workers in positions of leadership exacerbates this issue. Individuals from higher socioeconomic backgrounds dominate leadership roles, shaping organizational culture and decision-making processes. This imbalance of power perpetuates a cycle of marginalization for lower SES workers, as their perspectives and experiences are not adequately represented or considered in the workplace. Phenomenological research provides a unique opportunity to address this imbalance by centering the experiences and

perspectives of lower SES workers (Gallagher & Zahavi, 2020; Groshen & Holzer, 2021; Vagle, 2018). Phenomenology, as a qualitative research approach, seeks to understand the lived experiences of individuals and how they make sense of their world. By adopting a phenomenological lens, researchers can create a safe and inclusive space for lower SES workers to share their narratives, challenges, and aspirations in the workplace (Sloan & Bowe, 2014).

The current study on cleaning workers' perceptions of technology, through the use of a phenomenological approach, advances a more detailed understanding of lower SES workers (Albizu & Estensoro, 2024). Through in-depth interviews, the study allows cleaning workers to express their experiences openly and without judgment (Van Manen, 2023). This process not only provides valuable insights into the challenges and implications of technological advancements in the cleaning industry but also empowers participants by validating their experiences and amplifying their voices in the discourse surrounding workplace advancements (Tracy, 2019). Moreover, phenomenological research offers a departure from traditional research methods that may perpetuate power differentials and marginalize lower SES workers. In contrast to quantitative approaches that prioritize numerical data and statistical analysis, phenomenology prioritizes the rich, nuanced narratives of individuals, allowing for a deeper understanding of their lived experiences (Tracy, 2019; Van Manen, 2023). This qualitative approach acknowledges the complexity of human experiences and provides a platform for lower SES workers to share their stories authentically.

By elevating the voices of lower SES workers through phenomenological research, organizations can gain valuable insights into the unique challenges and perspectives of this population. These insights can inform more inclusive and equitable workplace policies and practices that address the needs and concerns of lower SES workers (Albizu & Estensoro, 2024).

Additionally, by actively involving lower SES workers in research processes, organizations can promote a culture of inclusivity and empowerment that values diverse perspectives and experiences. Additionally, phenomenological research has the potential to foster a sense of agency and empowerment among lower SES workers by validating their experiences and recognizing their contributions to the workplace. By providing a platform for lower SES workers to share their stories and perspectives, phenomenological research acknowledges the value of their experiences and positions them as active agents in shaping workplace discourse and practices (Albizu & Estensoro, 2024; Groshen & Holzer, 2021).

Overall, research has shown that marginalized workers, including immigrants, women, and individuals with lower educational attainment, may face unique challenges and barriers in adopting and adapting to new technologies in the workplace (Groshen & Holzer, 2021; Imran et al., 2023). Therefore, exploring the intersectionality of technology use and socioeconomic factors among cleaning workers is crucial for promoting equity and inclusion in the industry. In light of these considerations, this study seeks to address the gap in the literature by examining the lived experiences of cleaning workers in the context of technology advancements and use in the cleaning industry. By centering the voices and perspectives of cleaning workers, this study aims to shed light on the opportunities and challenges associated with technology adoption, as well as the implications for workplace dynamics, job satisfaction, and occupational health and safety. This study is led by the following main research question:

RQ1) What are the lived and career experiences of janitors and cleaning service employees in adapting to technological shifts in the cleaning industry?

1.2 Problem Statement

Despite the increasing integration of critical new technologies in various industries, there exists a significant gap in the literature concerning the experiences of lower socioeconomic status (SES) workers with limited formal education and training opportunities (Gallagher & Zahavi, 2020; Vagle, 2018). These individuals may face unique challenges in adapting to and utilizing new technologies within their work environments. Moreover, there is a dearth of research examining how these workers navigate transitions prompted by the introduction of these technologies and how such transitions align with established work adjustment theories (Autor et al., 2020; Groshen & Holzer, 2021). The intersection of lower SES, limited formal education, and access to educational and training opportunities creates a distinct context that warrants investigation. Understanding the experiences of this population is crucial, particularly in industries where the adoption of new technologies is essential for improved productivity, safety, and overall health-related outcomes.

Therefore, this study aims to address this gap in the literature by exploring the experiences of lower SES workers with limited formal education and training opportunities regarding the integration of critical new technologies into their work environments. Specifically, this research seeks to examine the challenges faced by these workers, the strategies they employ to adapt to technological changes, and the impact of such transitions on their work adjustment processes. By integrating insights from work adjustment theory, this study seeks to provide a comprehensive understanding of how lower SES workers with limited formal education and training opportunities navigate transitions prompted by the introduction of new technologies. This research not only contributes to filling the existing gap in the literature but also offers practical implications for supporting the integration of critical new technologies in diverse work settings while promoting the well-being and professional development of lower SES workers.

1.3 Statement of Significance

The significance of the current study emerges from the ability to fill gaps in our understanding of no only low SES employee experience, but also gaps in current understandings of cleaning businesses health and safety considerations. From a business perspective, the research aims to inform best practice by addressing key challenges and opportunities associated with the implementation of new technology, specifically within the cleaning industry. The study raises critical questions regarding whether cleaning companies that implement new technology are simultaneously considering the needs of their employees and particularly their lower socioeconomic status (SES) employees who may lack access to the education, training, equipment, and reliable data connectivity to fully embrace such changes (Autor et al., 2020; Groshen & Holzer, 2021).

The study underscores the importance of considering access and availability of reliable data/Wi-Fi infrastructure as essential factors in the successful adoption of new technology within businesses. Moreover, the research aims to explore the barriers faced by employees tasked with accessing and utilizing new technology, providing insights that can inform strategies for overcoming these barriers and facilitating successful technology implementation. The findings of the study are expected to have broader applicability to similar businesses and business settings with a similar employee demographic, providing valuable insights for organizations considering the implementation of new technology to streamline their business practices. Additionally, the study aims to provide empirical evidence of the return on investment (ROI) of new technology implementation for businesses, including the benefits of daily, weekly, and monthly quality reports for tasks and assigned tasks from contract agreements. These findings are expected to demonstrate

the value of new technology in improving client satisfaction, attracting new clients, and retaining existing clients, thereby providing a competitive advantage to businesses.

From a health and safety perspective, the research aims to evaluate the effectiveness of new technology implementation in lowering illness rates within the cleaning industry. By examining before and after, or longitudinal data related to cleaning practices and health outcomes, the study seeks to provide empirical evidence of the impact of new technology on reducing the spread of illnesses. Furthermore, the study draws on existing research in athletics, such as wrestling and football, to explore different approaches to preventing the spread of infections like ringworm, and applies these insights to the cleaning industry context. Importantly, the study addresses the clear gap in the literature concerning the experiences of lower SES workers with limited formal education and training opportunities in adapting to and transitioning with new technology in their work environments. By employing a phenomenological approach and integrating insights from work adjustment theory, the research aims to provide a comprehensive understanding of the experiences and transitions of this population in response to new technology implementation. The researcher's direct access to this population of lower SES employees in the cleaning industry facilitates an in-depth exploration of their experiences and perspectives, contributing to filling the existing gap in the literature and informing strategies to support the well-being and professional development of lower SES workers in the face of technological change.

From an employee experience perspective, the cleaning industry employs a significant number of individuals from lower socioeconomic status (SES) backgrounds with limited formal education and training opportunities (. These workers often find themselves in compromised positions, lacking job security, contractual protections, and social capital due to their precarious employment arrangements, such as hourly pay and lack of long-term employment contracts. These

factors contribute to their vulnerability within the workforce and underscore the importance of exploring their experiences with implementing new technology in their work environments. Considering their compromised status and lack of authority within the industry, it is crucial to provide a safe space for lower SES cleaning industry workers to share their experiences and perceptions openly. This necessitates a phenomenological approach to the study, which prioritizes understanding the essence of human experiences and providing a platform for participants to articulate their lived realities without fear of repercussion or judgment.

Further, qualitative methods, particularly phenomenology, offer an ideal framework for capturing the nuanced experiences of these compromised employees. By conducting in-depth interviews and qualitative analysis guided by phenomenological principles, this study aims to uncover the multifaceted challenges, coping mechanisms, and perceptions of lower SES cleaning industry workers regarding the integration of new technology into their work routines. Previous research utilizing qualitative interviews with vulnerable populations in similar precarious employment situations has demonstrated the value of providing a safe and supportive environment for participants to share their perspectives. For instance, Smith et al. (2018) conducted qualitative interviews with temporary agency workers to explore their experiences with workplace safety, highlighting the importance of creating a trusting and non-judgmental space for participants to express their concerns and experiences. Additionally, Shim et al., (2022) effectively utilized phenomenological inquiry to examine the lived experiences of meaningful work for low SES employees.

By adopting a phenomenological approach, this study not only aims to shed light on the experiences of lower SES cleaning industry workers with new technology but also seeks to amplify their voices and provide a platform for their narratives to be heard. In doing so, this research

contributes to a more comprehensive understanding of the challenges faced by compromised employees in adapting to technological advancements within the cleaning industry. Overall, by providing a safe and supportive space for lower SES cleaning industry workers to share their experiences, this study aims to elevate their voices, uncover valuable insights, and inform strategies for supporting their well-being and professional development in the face of technological change.

Chapter 2.0 - Theoretical Underpinnings and Literature Review

2.1 Introduction and Background

The cleaning industry is a fast growing and ever-changing sector in society. The cleaning services industry is made up of two main branches: commercial and residential. Residential businesses clean people's homes, while commercial ones focus on office buildings, schools and other public areas (Suleiman & Svendsen, 2015). Globally, the cleaning sector is a significant employer. For example, over 4 million cleaning workers and janitors are employed in Europe, and over and 2.3 million in the USA (Bureau of Labor Statistics; European Cleaning and Facilities Services Industry (EFCI), 2019). The global housekeeping and janitorial services industry generates an estimated annual revenue of approximately 97 billion dollars, highlighting its significant economic contribution (Statista, 2019a).

Similarly, the revenue for carpet and upholstery cleaning services worldwide is estimated to be around 4.1 billion dollars annually, underlining the substantial financial scale of the cleaning sector (Statista, 2019b). Beyond its economic impact, cleaning work is essential for the proper functioning of society and its economy, as it contributes to maintaining well-being, life quality, basic hygiene, health, and safety across various settings such as homes, factories, hospitals, and stores (Becker-Schmidt & Krüger, 2009; Mudenha et al., 2018). This vital role positions cleaning as a foundational aspect of facilitating productive work environments, akin to other forms of reproductive labor essential for enabling productive activities (Becker-Schmidt & Krüger, 2009; Mudenha et al., 2018).

Furthermore, the cleaning service industry emerges as a significant consumer of chemicals, with an average cleaning worker estimated to utilize approximately 110 kilograms of hazardous chemicals annually (du Toit & Heinecken, 2021; Mudenha et al., 2018). Despite the recent increase

in the adoption of dry-cleaning methods, substantial quantities of chemicals continue to be utilized within the industry (Mudenha et al., 2018). Understanding the environmental and health implications of such chemical usage is essential for promoting sustainable and safer cleaning practices within the industry (Mudenha et al., 2018). In a study conducted by du Toit and Heinecken (2021), the motivations of cleaning profession workers were examined, revealing three key factors: the nature of the domestic cleaning service supplier, the services rendered by domestic workers, and the tripartite employment relationships (du Toit & Heinecken, 2021). These motivations suggest that clients benefit from functional and numerical flexibility when engaging with domestic cleaning services, compared to directly employing domestic workers (du Toit & Heinecken, 2021). Understanding these motivations is crucial for both service providers and clients to ensure effective and mutually beneficial working relationships within the cleaning profession.

According to additional statistics across the cleaning industry, North America maintains the largest market, followed closely by Asia (Mudenha et al., 2018). In the commercial sector, the janitorial services industry had over 3.24 million employees in 2018, with a significant portion of business insurance policies being purchased in Florida, Texas, and California (Stata, 2019.). Moreover, 65.8% of janitors and building cleaners identify as male (Stata, 2019). In contrast, in the residential sector, the average age of housekeepers, cooks, or cleaners is 47, and approximately 76% of individuals in these roles are women (Thimble, n.d.). Regarding race and ethnicity, 61.5% of housekeepers, cleaners, and cooks are white, 19.6% are Hispanic or Latino, and 10% are Black (Thimble, n.d.). Furthermore, 31% of housekeepers have a high school diploma as their highest level of education (Thimble, n.d.). In the commercial sector, the United States had 1,063,988 janitorial services businesses in 2021, employing 1,990,510 janitors and cleaners, with a median

salary of $29,080 (Thimble, n.d.). Additionally, the estimated annual revenue of carpet and upholstery cleaning businesses in the U.S. is $4 billion, and the commercial cleaning industry is expected to grow annually at a rate of 5.4% through 2025 (Thimble, n.d.). On the other hand, in the residential sector, there were 795,590 residential maids and housekeepers working in the U.S. as of May 2020, with an average annual salary of $28,010.9 (Thimble, n.d.). Employment of maids and housekeepers is expected to grow 6.08% through 2029, and vacuuming services are anticipated to grow at a compound annual growth rate of 6.2% through 2022 (Thimble, n.d.). Overall, the cleaning industry exhibits significant variations in demographics, employment trends, and market projections across its commercial and residential sectors.

Figure 1

U.S. Cleaning Serves Market
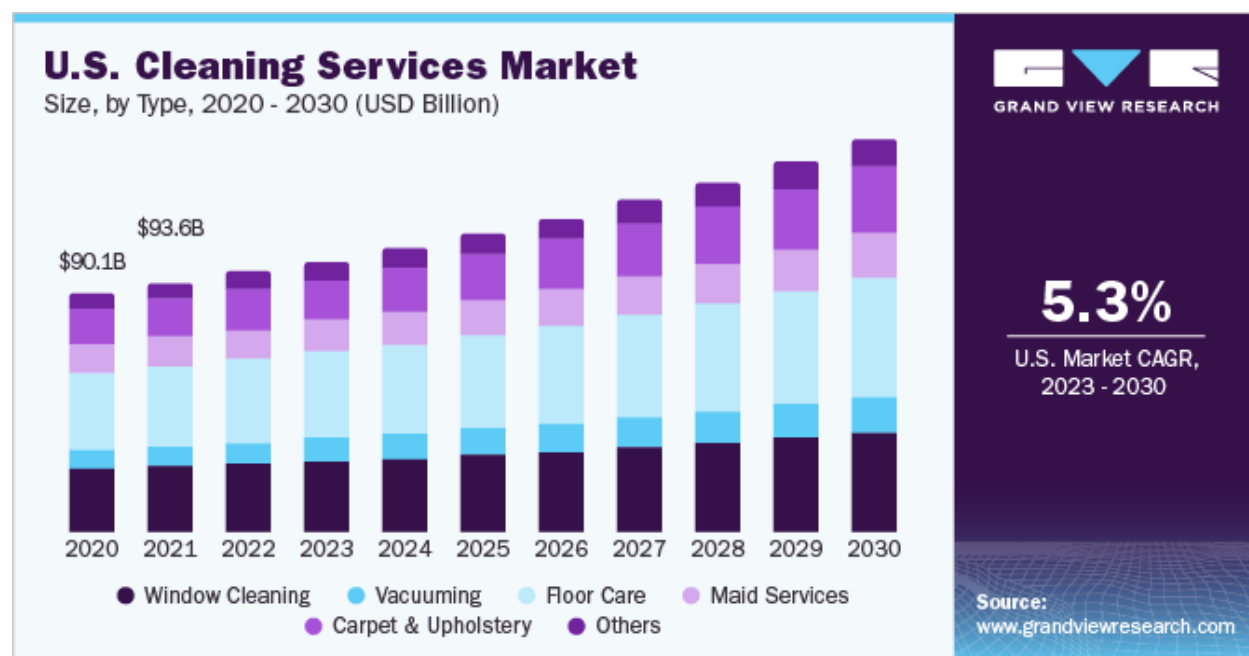
2.2. Cleaning Industry Training and Standards

Professional cleaners play a vital role in ensuring public health by creating clean and sanitized indoor environments, especially in the context of infectious disease outbreaks like the

COVID-19 pandemic (Chun, 2023). The effectiveness of cleaning protocols in reducing the spread of viruses and bacteria has been established through previous research that highlights the role of environmental surfaces in disease transmission (Choi et al., 2021). Effective cleaning practices not only remove visible dirt and contaminants but also target invisible pathogens that may linger on surfaces, thus reducing the risk of infection (Chun, 2023). Studies have demonstrated that proper cleaning and disinfection of frequently touched surfaces in residential and commercial settings can significantly reduce the transmission of infectious agents, including respiratory viruses like coronaviruses (Chawla et al., 2023). Furthermore, adherence to standardized cleaning protocols, coupled with the use of appropriate cleaning agents and disinfectants, is essential for mitigating the risk of cross-contamination and maintaining hygienic environments conducive to public health (Choi et al., 2021).

In healthcare settings, where infection control is paramount, the implementation of rigorous cleaning protocols is crucial for preventing the spread of healthcare-associated infections (HAI) and protecting vulnerable patient populations (Bedrosian et al.,2014). Research has demonstrated that effective cleaning practices, including routine disinfection of high-touch surfaces and equipment, contribute to reducing the incidence of HAIs and improving patient outcomes (Bedrosian et al., 2014). Moreover, the selection and proper use of cleaning agents and disinfectants are critical considerations in healthcare cleaning protocols, as certain pathogens may require specific disinfection strategies for effective eradication (Chawla et al., 2023). Additionally, the regular monitoring and evaluation of cleaning efficacy through environmental sampling and quality assurance measures are essential components of comprehensive infection prevention and control programs in healthcare facilities (Choi et al., 2021). By adhering to evidence-based cleaning guidelines and leveraging innovative cleaning technologies, healthcare institutions can

enhance the safety and well-being of patients, staff, and visitors while mitigating the risk of healthcare-associated infections (Bedrosian et al., 2014).

The cleaning profession has historically been associated with various ergonomic and chemical hazards, which significantly increase the risk of occupational injury (Alamgir & Yu, 2008). These hazards pose a considerable challenge to the health and safety of cleaning workers, highlighting the need for effective risk mitigation strategies and ergonomic interventions within the industry. Furthermore, disparities in training standards and processes exist across different companies and countries, as highlighted in a study by Suleiman and Svendsen (2015). Their research found that while 72.3% of employees reported receiving training concurrently with task performances, only 67.4% experienced workers conducting these trainings. This incongruity between employers' perceptions of workers' competence levels and the actual training received underscores the need for standardized training protocols and ongoing assessment of worker proficiency.

Moreover, findings from Mudenha et al. (2018) indicate a desire among cleaners for additional training to enhance their awareness of health and safety responsibilities. Despite the provision of training, many cleaners exhibited poor awareness of these responsibilities, emphasizing the necessity for continuous training programs within the cleaning industry. The study revealed that 63.6% of cleaners had received training on health and safety responsibilities in the previous 12 months, primarily through in-house, on-the-job training. However, the effectiveness of these training initiatives in improving awareness and reducing occupational risks remains a critical area for improvement within the cleaning profession.

Additionally, Lentzos et al. (2022) highlight the evolving landscape of biological risks, which present new challenges in preventing accidental, reckless, or malicious misuse of biology.

The authors argue that existing oversight systems for ensuring the safe and responsible conduct of life sciences research are lagging behind these emerging risks. They call for urgent reforms to realign biorisk management with contemporary challenges, advocating for the establishment of an international framework to guide biorisk management practices. This framework should encompass values, principles, and guidelines for developing and implementing governance mechanisms, as well as the creation of an authoritative international institution tasked with registering and overseeing maximum containment facilities and high-risk research activities.

2.3 Cleaning Profession Adaptations During Covid-19

The COVID-19 pandemic fundamentally changed aspects of the cleaning industry and necessitated a widespread increase in the utilization of new technologies across various settings, including public facilities, transportation, healthcare facilities, and households, as a preventive measure against the transmission of the virus (Dewey et al., 2021). Hotels, in particular, have implemented stringent cleaning and disinfecting protocols to ensure the safety of guests and staff members (Neog, 2021). These protocols involve heightened attention to high-touch surfaces and increased frequency of cleaning in public spaces such as reception areas, elevators, doorknobs, and restrooms (Jose et al., 2023; Kisla et al., 2023). Moreover, the adoption of digitalization in hotel services, such as digital menus and contactless check-ins, has been embraced to minimize potential sources of contamination (Neog, 2021). However, despite the imperative nature of their work, workers in the cleaning services industry often find themselves lacking in specific training and information necessary to carry out their duties effectively (Dias et al., 2022). This is particularly concerning given the significant health inequalities experienced by hotel housekeepers, who face not only physical and chemical hazards but also high levels of

psychological stress associated with low job control and insecurity (Rosemberg, 2020; Alwadood et al., 2021).

The COVID-19 pandemic heightened concerns among hotel workers, especially housekeepers, regarding job security and the potential long-term implications of increased automation and technological advancements in the industry (Rosemberg, 2020; Alwadood et al., 2021). While the adoption of technology may streamline certain tasks and enhance efficiency, there is a prevailing fear among workers of being replaced by automation, leading to reduced job hours and increased job insecurity (Rosemberg, 2020; Alwadood et al., 2021; Neog, 2021). Moreover, the current discourse surrounding the use of hotels as quarantine spaces for individuals exposed to COVID-19 further exacerbates concerns about the health and safety of hotel workers, particularly housekeepers (Alwadood et al., 2021).

The pandemic also significantly impacted the mental health and well-being of cleaning workers, with structured interviews revealing predominant concerns related to preventing the spread of infection, fear of losing loved ones, and anxiety about accessing medical care (Dias et al., 2022). Consequently, there is a pressing need for enhanced dissemination of individual protection measures, comprehensive training, improved working conditions, and access to psychological support services for cleaning workers (Dias et al., 2022).

In the broader context, cleaning work is recognized as a system-relevant profession essential for maintaining hygiene, health, and safety across various sectors, including healthcare, hospitality, and public facilities (Sardadvar, 2020). Despite its essential role, cleaning work remains undervalued and often overlooked in discussions surrounding essential workers and frontline responders (Sardadvar, 2020). Nonetheless, the importance of cleaning work in

combating the COVID-19 pandemic cannot be understated, as it directly contributes to infection prevention and control efforts (Sardadvar, 2020; Shukla et al., 2021).

2.4. Technology Socialization and Use Among Lower SES Populations

Overall, it has been well established that cleaning work is vital to a functioning society (Karr et al., 2021; Suleiman & Svendsen, 2015). Previous research has established that if cleaners are not able to report to work, then a building, school, hospital, hotel, etc. simply cannot be adequately used by patrons (Agarwal et al., 2021; Chang et al., 2021; Karr et al., 2021). This risk was heightened during the Covid-19 pandemic as clients often requested additional cleaners beyond their current initial contracts at that time (Chang et a., 2021). These clients deemed it necessary to hire additional cleaning services in order for their spaces to be in use throughout the pandemic and beyond (Agarwal et al., 2021). As a result, these circumstances serve to further emphasize that the work that cleaners perform on a daily basis should rank close to or alongside healthcare workers and frontline workers (Do & Frank, 2021).

In contemporary society, technology plays a pivotal role in various aspects of life, including communication, education, and access to information. However, despite the widespread integration of technology, significant disparities persist in its adoption and usage, particularly among lower socioeconomic status (SES) populations and individuals with lower levels of formal education. Lower SES individuals often encounter multiple barriers to technology adoption, contributing to what is commonly referred to as the "digital divide." Financial constraints, limited access to technology infrastructure, and lower levels of digital literacy are among the primary barriers faced by individuals from lower SES backgrounds (Ball et al., 2019; Singh et al., 2022). The cost of purchasing and maintaining digital devices, such as computers and smartphones, can be prohibitive for lower-income households, leading to disparities in ownership and access to these

technologies (Warschauer, 2017). Moreover, disparities in internet access further exacerbate the digital divide, with lower SES individuals being less likely to have reliable and high-speed internet connections at home (Chawla et al., 2023). These challenges highlight the need for targeted interventions aimed at addressing the structural barriers that hinder technology adoption among lower SES populations.

Digital literacy, defined as the ability to use digital devices and navigate online environments effectively, plays a crucial role in determining individuals' ability to engage with technology (Ball et al., 2019; Warschauer, 2017). Individuals with lower levels of formal education often exhibit lower levels of digital literacy, which can impede their ability to access online information, participate in digital communities, and utilize online resources for educational and professional purposes. Limited digital literacy among lower-educated individuals is compounded by a lack of access to formal technology training programs, further widening the digital divide (Rosic et al., 2024). Addressing the digital literacy gap through targeted educational initiatives is essential for empowering individuals with the skills necessary to navigate an increasingly digital world.

Cultural perceptions of technology and its relevance to daily life significantly influence individuals' willingness to adopt and use digital devices (Dabbagh & Kitsantas, 2012). In many cases, cultural beliefs and norms shape individuals' attitudes towards technology, impacting their motivations and behaviors regarding its adoption and use. Additionally, social networks and support systems play a crucial role in shaping individuals' access to technology resources and their ability to acquire digital skills (Ball et al., 2019; Warschauer, 2017). Communities with strong social networks and supportive environments may be more conducive to facilitating technology adoption and use among lower SES populations and individuals with lower levels of formal

education (Ball et al., 2019). Recognizing the influence of cultural and social factors is essential for designing culturally sensitive and community-driven interventions aimed at promoting digital inclusion.

Understanding the multifaceted nature of technology socialization and use among lower SES populations and individuals with lower levels of formal education is critical for designing effective interventions and policies to bridge the digital divide (Ball et al., 2019). Future research should focus on exploring innovative approaches to enhancing digital literacy skills among underserved populations, including community-based programs, digital skills training initiatives, and partnerships with local organizations (Singh et al., 2022). Moreover, policymakers and stakeholders should prioritize efforts to improve access to affordable technology infrastructure and internet connectivity in underserved communities, thereby promoting digital inclusion and equitable access to technology resources (Van Dijk, 2019). By addressing these challenges through collaborative and holistic strategies, stakeholders can work towards achieving greater digital equity and social inclusion for all individuals, regardless of their socioeconomic background or level of formal education.

2.5 New Technology Training Approaches

Lower socioeconomic status (SES) individuals often encounter barriers to formal education, such as difficulties in completing high school or pursuing higher education, leading them to seek alternative avenues for learning about new technology (Ball et al., 2019). Specifically, previous research has determined that both informal learning environments and workplace settings serve as the primary mechanisms by which those lower SES employees are provided with the training and experiences to best understand and use new technology (Autor et al., 2020; Deming & Noray, 2020). Research indicates that lower SES individuals frequently turn to informal learning

environments outside of traditional schooling settings to engage with new technology. These informal learning spaces, including community centers, public libraries, and non-profit organizations, play a critical role in providing access to technology and digital literacy training for underserved populations (Warschauer, 2017). Within these community-based initiatives, tailored hands-on training, workshops, and resources are offered to meet the specific needs of lower SES individuals, empowering them to develop essential digital skills and competencies (Singh et al., 2022).

Further, research has indicated that for many lower SES individuals, the workplace serves as a primary context for interacting with new technology and acquiring digital skills (Ball et al., 2019). Entry-level jobs across various industries increasingly demand basic computer literacy and familiarity with digital tools and software (Rosic et al., 2024). Employers recognize this need and often provide on-the-job training or digital skills development programs to enhance employees' technological proficiency, particularly in sectors such as retail, hospitality, and manufacturing (Van Dijk, 2019). Additionally, peer learning and informal mentorship within the workplace environment play a significant role in facilitating knowledge sharing and skill acquisition among lower SES workers (Kabeer, 2014).

2.5.1 Informal Learning Environments for New Technology

Research indicates that lower socioeconomic status (SES) individuals frequently turn to informal learning environments outside of formal schooling settings to engage with new technology (Ames, 2023; Smith & Wingate, 2016). These informal learning spaces, which include community centers, public libraries, and non-profit organizations, serve as critical hubs for providing access to technology and digital literacy training for underserved populations (Warschauer, 2017). Unlike traditional educational institutions, these community-based initiatives

are often more accessible and accommodating to individuals with limited resources or educational opportunities (Smith & Wingate 2016). Within these informal learning spaces, various programs and resources are tailored specifically to the needs of lower SES individuals, offering hands-on training, workshops, and educational materials focused on digital skills and competencies (Singh et al., 2022). For example, community centers may host computer literacy classes, coding workshops, or technology training sessions aimed at improving participants' digital literacy and proficiency. These initiatives are designed to empower lower SES individuals by providing them with the necessary tools and resources to navigate the increasingly digital world.

Moreover, informal learning environments offer a supportive and collaborative atmosphere conducive to skill development and knowledge sharing among participants (Smith & Wingate, 2016). Individuals from similar socioeconomic backgrounds can connect with one another, exchange experiences, and learn from each other's successes and challenges. This peer-to-peer learning dynamic fosters a sense of community and camaraderie, creating a conducive environment for acquiring new technology skills (Warschauer, 2017). Furthermore, the flexibility and accessibility of informal learning spaces make them particularly well-suited for addressing the diverse needs and preferences of lower SES individuals. Unlike formal educational settings, which may have rigid schedules and curriculum requirements, community-based initiatives can adapt their programs and offerings to accommodate participants' varying skill levels, learning styles, and time constraints. This adaptability ensures that individuals from all backgrounds have the opportunity to engage with technology and acquire digital literacy skills at their own pace (Singh et al., 2022).

Importantly, informal learning environments also provide a sense of empowerment and agency to lower SES individuals, allowing them to take control of their learning journey and build

confidence in their technological abilities. By offering opportunities for hands-on exploration and experimentation with technology, these initiatives help participants develop a sense of mastery and competence, which can have a positive impact on their overall self-esteem and well-being (Warschauer, 2017). Informal learning environments play a crucial role in bridging the digital divide and empowering lower SES individuals to engage with new technology. By providing accessible, flexible, and supportive spaces for digital literacy training and skill development, community centers, public libraries, and non-profit organizations enable underserved populations to acquire the essential digital skills and competencies needed to thrive in today's technology-driven society.

While informal learning environments offer valuable opportunities for lower SES individuals to engage with new technology, there are also potential downsides to relying solely on these settings for digital literacy training and skill development. Research suggests that informal learning environments may not always provide comprehensive or structured education in technology-related subjects, leading to potential gaps in knowledge and skill acquisition (Selwyn, 2010). One limitation of informal learning environments is the lack of standardized curriculum and assessment practices, which can result in variability in the quality and depth of instruction. Unlike formal educational institutions that adhere to established curriculum standards, informal programs may lack consistency and coherence in their content delivery, making it challenging for participants to acquire a comprehensive understanding of technology concepts and applications (Warschauer, 2017). Furthermore, informal learning environments may face resource constraints and limited funding, which can impact the availability and accessibility of technology-related resources and support services. Public libraries and community centers, for example, may struggle to keep pace with rapidly evolving technology trends and provide up-to-date equipment, software,

and instructional materials (Selwyn, 2010). This resource limitation may hinder participants' ability to engage with the latest technology tools and platforms, limiting their exposure and proficiency in emerging digital technologies.

Additionally, informal learning environments may lack formal certification or credentialing mechanisms, which can be important for demonstrating proficiency and validating digital skills to employers and educational institutions. While participants may gain valuable hands-on experience and knowledge through informal programs, the absence of recognized credentials or certifications may limit their opportunities for employment or further education in technology-related fields (Selwyn, 2010). Moreover, informal learning environments may not always address the broader socio-economic barriers and structural inequalities that contribute to digital exclusion among lower SES individuals. While community-based initiatives can provide valuable support and resources, they may not adequately address systemic issues such as limited access to affordable internet connectivity, digital devices, and ongoing technical support, which are essential for sustained engagement with technology (Warschauer, 2017). While informal learning environments play a vital role in providing access to technology and digital literacy training for lower SES individuals, they are not without limitations. To ensure comprehensive and equitable digital inclusion, it is essential to complement informal learning initiatives with formal educational programs, policy interventions, and structural reforms that address systemic barriers and promote sustainable access to technology resources and opportunities for all individuals, regardless of socioeconomic status.

2.5.2 Workplace Training Burdens

Workplace settings play a pivotal role in shaping the digital literacy and technological proficiency of lower socioeconomic status (SES) individuals, as these environments often serve as

primary contexts for engaging with new technology and acquiring digital skills. Entry-level jobs in various industries, including retail, hospitality, and manufacturing, increasingly require basic computer literacy and familiarity with digital tools and software (Rosic et al., 2024). In response to these demands, employers may provide on-the-job training or offer digital skills development programs to enhance employees' technological proficiency (Van Dijk, 2019). These programs are particularly important for lower SES workers, who may have limited access to formal education or training opportunities outside of the workplace. Moreover, workplace environments offer opportunities for peer learning and informal mentorship, which can facilitate knowledge sharing and skill acquisition among lower SES workers (Kabeer, 2014). Lower SES individuals often benefit from hands-on experience and guidance from more experienced colleagues, enabling them to navigate and master new technologies in real-world work settings. Peer learning and informal mentorship create a supportive learning environment where lower SES workers can learn from their peers' experiences, experiment with new technologies, and develop practical skills that are directly applicable to their job responsibilities.

However, the burden of training lower SES employees in new technologies falls disproportionately on businesses, especially in industries where technological advancements are rapid and ongoing. While companies that develop technology may profit from selling their products and services to businesses, they often do not bear the financial burden of providing adequate resources for training those who purchase their equipment (Brown & Strother, 2019). This places a significant strain on businesses, particularly small and medium-sized enterprises (SMEs), which may lack the resources and expertise to develop comprehensive training programs for their employees. Furthermore, lower SES individuals who are tasked with using new technologies in the workplace may face challenges due to their limited educational background

and lack of understanding of complex technological systems. Research suggests that individuals with lower levels of education may struggle to comprehend and effectively utilize advanced technologies, leading to reduced productivity and job satisfaction (Selwyn, 2010). As a result, businesses may need to invest additional time and resources in providing targeted training and support to lower SES employees to ensure their successful integration into the workforce.

Additionally, the lack of adequate training and support for lower SES employees in using new technologies can exacerbate existing socioeconomic inequalities in the workforce. Without access to comprehensive training programs and ongoing support, lower SES workers may be at a disadvantage compared to their higher SES counterparts, limiting their career advancement opportunities and perpetuating the digital divide (Van Dijk, 2019). Addressing this disparity requires businesses to prioritize training and skill development initiatives that are inclusive and accessible to individuals from diverse socioeconomic backgrounds. Although workplace settings play a critical role in shaping the digital skills and technological proficiency of lower SES individuals, the burden of training employees in new technologies often falls disproportionately on businesses, placing strains on resources and exacerbating socioeconomic inequalities in the workforce.

2.6 Blue Collar Occupations and Technology Advancements

The integration of new technology has spurred significant transformations across various service industries, such as cleaning services, and provides the opportunity for comparative considerations of similar blue-collar workers' and their adaptation to technological advancements. Drawing parallels with industries similar to the cleaning services sector, such as manufacturing, construction, transportation and logistics, agriculture, and hospitality and food service, reveals common challenges and opportunities associated with technological change (Duckett et al., 2018;

Jones & Patel, 2019; Kabeer, 2014; Karimi & Iordanova, 2021; Mukherjee et al., 2023; Nguyen et al., 2019; Vu et al., 2017). First, in the manufacturing industry, which employs a substantial number of blue-collar workers, advancements in automation, robotics, and digital manufacturing have reshaped job roles and increased the demand for skilled workers proficient in operating and maintaining advanced machinery (Chawla et al., 2023; Smith et al., 2020). Similarly, the construction industry, which is characterized by physically demanding tasks, has witnessed technological advancements such as Building Information Modeling (BIM) and digital design tools, which has altered the job processes and safety protocols for employees and have subsequently impacted workers' job roles and skill requirements (Karimi & Iordanova, 2021). Workers in the transportation and logistics industry engage in physically demanding tasks such as loading and unloading cargo, driving, and inventory management (Kabeer, 2014). Technological advancements in transportation, including vehicle automation and tracking systems, have influenced job roles and workforce dynamics, raising concerns about job displacement and the need for upskilling (Nguyen et al., 2019).

Similarly, in the agriculture industry, technological advancements such as precision farming and automated machinery reshaped job roles and increased the demand for workers with technical skills in operating advanced equipment (Duckett et al., 2018). In the hospitality and food service industry, workers perform physically demanding and repetitive tasks, including food preparation, cleaning, and customer service (Vu et al., 2017). Technological advancements in this sector, such as automated ordering systems and robotic kitchen assistants, have influenced job roles and workforce dynamics, requiring workers to adapt to new technology-driven processes (Mukherjee et al., 2023). Through a comparative analysis of blue-collar workers' adaptation to new technology across multiple service industries, researchers gain insights into the implications of

technological change for job roles, skill requirements, and workforce dynamics. By understanding the common challenges and opportunities associated with technological advancements, stakeholders can develop strategies to facilitate blue-collar workers' adaptation to new technology in the workplace (Kim et al., 2017).

2.6.1 Specific Instances of Technology Advancement for Employees

In recent years, the integration of sophisticated machines, such as robots equipped with artificial intelligence, into the workplace has raised questions about their impact on human workers' status and interactions (Grundke, 2023; Kisla et al., 2023). Research by Grundke (2023) explored the phenomenon of status threat evoked by machines with human-like mental capabilities and its implications for individuals' willingness to interact with such machines in work-related contexts. Findings from two experiments revealed that individuals experienced higher levels of status threat when faced with machines outperforming humans in tasks requiring agency and experience. Despite the perceived threat, participants showed a greater willingness to interact with these machines, attributing their acceptance to the perceived usefulness of the technology. Further, the advent of digitalization, particularly within the context of Industry 4.0, has led to significant transformations in blue- and white-collar work (Waschull et al., 2022). Waschull et al. (2022) conducted an in-depth industrial case study to investigate the simultaneous effects of digitalization on both types of work and the underlying (re)design process of human work. Their findings underscored the importance of considering human factors, such as system designers' motivation and early involvement of system users, in achieving favorable work design outcomes. The study emphasized the need for organizations to incorporate social performance indicators alongside operational metrics to ensure successful digitalization efforts.

Figure 2.

Technologies to Adopt in the Next 12 Months

Technologies to adopt in the next 12 months

Cleaning validation programs/technologies	41%
Autonomous equipment/robotics	23%
Internet of things (IOT) smart technologies	13%
UV disinfection systems	9%
Enterprise resource planning (ERP) systems	8%
Other	6%

Furthermore, the spread of mobile internet applications, particularly e-hailing apps for taxis, has significantly impacted taxi driver behavior and operations (Rodriguez-Valencia et al., 2020). Rodriguez-Valencia et al. (2020) examined the implications of these applications on taxi operations, including the replacement of traditional communication methods with mobile apps and the subsequent changes in driver behavior. Their findings indicated that drivers using e-hailing apps experienced increased profitability compared to those relying on traditional methods. The study highlighted the benefits of mobile internet technologies in facilitating efficient matching of supply and demand in the taxi industry, ultimately enhancing drivers' profitability and improving overall service quality. Collectively, these results highlight the connections between technology adoption, human factors, and work design within the context of technological advancement. Understanding these dynamics is crucial for addressing disparities in technology socialization and use among lower SES populations and individuals with lower levels of formal education.

2.7 Influence of Technology Advancements on Low SES workers

In recent decades, technological advancements have reshaped various facets of the labor market, influencing the employment landscape and work conditions for individuals across different socioeconomic statuses (SES) (Ames et al., 2011). Technological advancements,

particularly automation and digitalization, have led to significant changes in the types of jobs available in the labor market. Low SES workers often face challenges in accessing high-skilled, technology-driven jobs due to limited education and training opportunities (Ames et al., 2011; Imran, 2023; OECD, 2020). As automation replaces routine tasks in various industries, low-skilled jobs are increasingly at risk of displacement, leading to potential unemployment or underemployment among low SES individuals (Ames et al., 2011; Autor, 2015). Moreover, the emergence of the gig economy and platform-based work has created new employment opportunities but often with precarious working conditions and limited social protections, exacerbating economic vulnerabilities among low SES workers (Kabeer, 2014).

Technology advancements have also influenced the quality of jobs available to low SES workers. While some technological innovations have improved efficiency and productivity in certain industries, they have also been associated with deskilling and job polarization, leading to a decline in the quality of low-skilled jobs (Frey & Osborne, 2017). Low SES workers are more likely to be employed in sectors vulnerable to automation, such as manufacturing and retail, where technological advancements have led to increased job insecurity and wage stagnation (Autor, 2015). Additionally, the rise of digital platforms for work has introduced new challenges related to precarious employment arrangements, lack of benefits, and limited job stability, disproportionately affecting low SES workers (Kabeer, 2014).

The influence of technology advancements on the overall well-being of low SES workers is multifaceted. While technological innovations have the potential to enhance productivity and economic growth, their uneven distribution and impact on employment opportunities and job quality can exacerbate socioeconomic inequalities (OECD, 2020). Low SES workers often face barriers in adapting to technological changes due to limited access to education, training, and

digital literacy skills (Autor, 2015; Imran, 2023). Moreover, the digital divide, characterized by unequal access to technology infrastructure and internet connectivity, further marginalizes low SES individuals, hindering their ability to fully participate in the digital economy (OECD, 2020).

Understanding the influence of technology advancements on low SES workers is essential for policymakers, employers, and stakeholders to address the challenges of socioeconomic inequality and promote inclusive economic growth. Efforts to improve access to education and training programs, enhance digital literacy skills, and provide support for displaced workers through reskilling and upskilling initiatives are crucial for empowering low SES individuals to adapt to technological changes (OECD, 2020). Additionally, policies aimed at promoting fair labor practices, strengthening social protections, and addressing the gig economy's challenges can help mitigate the adverse effects of technology advancements on low SES workers (Kabeer, 2014). Overall, technology advancements have profound implications for low SES workers, influencing their employment opportunities, job quality, and overall well-being. Addressing the challenges arising from technological changes requires a comprehensive approach that prioritizes education and training, promotes fair labor practices, and addresses socioeconomic inequalities to ensure inclusive economic growth and social justice.

2.8 Work Adjustment Theory

Based on the purpose and overall objective of the current study, as well as the implications for the population, the design and interpretation procedures for this research were led by the underpinnings of work adjustment theory (WAT). Specifically, WAT is a career development theory that explains how people fit into their work environments and how they cope with changes (Bayl-Smith & Griffin, 2015; Dawis & Lofquist, 1984). In that way, WAT serves as a prominent framework for understanding how individuals adapt to their work environments. This theory posits

that successful job performance and satisfaction result from the congruence between an individual's abilities, needs, and desires, and the demands and rewards of their job (Dawis & Lofquist, 1984; Ebly et al., 2013). WAT highlights the dynamic nature of the employee-job fit, emphasizing the importance of ongoing adjustments to maintain alignment between individual characteristics and job requirements (Dawis & Lofquist, 1984; Lleras, 2008). Specific to the current investigation, given the changes in new technology and the adoption of that new technology can be a significant occurrence for cleaning employees, WAT assists in further understanding their experiences.

That being said, it is important to acknowledge that an application of WAT within the context of low socioeconomic status (SES) employees, such as cleaners, presents unique considerations (Lleras, 2008). Individuals from low SES backgrounds often face systemic barriers and limited access to resources, which can influence their ability to adapt to changes in the workplace effectively. As a result, the intersection of WAT and low SES employee adaptation to job changes, drawing upon empirical research to provide insights into this complex phenomenon (Dawis & Lofquist, 1984; Harper & Shoffner, 2004; Hesketh & Griffin, 2005).

Given that WAT proposes that individuals engage in a continuous process of seeking and maintaining a balance between their personal characteristics and the demands of their work environment, for lower SES employees the stakes may be even higher (Dawis & Lofquist, 1984; Lleras, 2008). This process involves three key components: the person, the environment, and the interaction between the two. Within the context of low SES employees, the person-environment fit may be influenced by socioeconomic factors such as their educational background, their access to social support networks, and their overall financial stability (Hirschi, 2012). Importantly, research suggests that individuals from low SES backgrounds often experience greater difficulty

in achieving and maintaining a satisfactory person-environment fit due to socioeconomic disparities (Imran, 2023; Kalleberg, 2009). For example, low SES employees may have limited access to educational opportunities, which can impact their skill development and ability to meet job requirements in rapidly changing industries (Lleras, 2008). Additionally, financial instability may hinder their capacity to invest in resources that facilitate job adaptation, such as training programs or professional development opportunities (Kraiger et al., 2014). The ability of low SES employees to adapt to changes in their job environment is crucial for their long-term success and well-being. Job changes, such as organizational restructuring, technological advancements, or shifts in job responsibilities, require employees to adjust their skills, knowledge, and attitudes to remain effective in their roles (Thompson & Prottas, 2006). However, the process of adaptation can be particularly challenging for low SES employees due to limited access to support systems and resources and therefore necessitates the investigation of these experiences and perceptions of adaptation for individuals within this category, such as cleaning employees (Imran, 2023).

Additional research suggests that social support plays a critical role in facilitating job adaptation among low SES employees (Reitz et al., 2018). Social support can come from various sources, including supervisors, coworkers, and community organizations, and can provide instrumental assistance, emotional encouragement, and informational resources to navigate job changes (House, 1981). For example, mentorship programs that connect low SES employees with more experienced colleagues can offer guidance and practical advice on adapting to new job responsibilities or technologies (Eby et al., 2013). Moreover, interventions aimed at enhancing the employability of low SES individuals can promote their ability to adapt to changes in the job market (Van der Heijden et al., 2016). These interventions may include training programs, career counseling, and skill-building initiatives designed to improve the job readiness and resilience of

low SES employees (Verhaest & Omey, 2013). By equipping individuals with the necessary skills and resources, organizations can empower low SES employees to navigate job changes effectively and enhance their overall work adjustment.

3.0 Chapter 3 – Methodology

3.1. Research Gap

The study addresses the gap in literature regarding the experiences of lower socioeconomic status (SES) workers with limited formal education and training opportunities in adapting to and utilizing new technologies in their work environments. It aims to explore the challenges faced by these workers, their adaptation strategies, and the impact of technological transitions on their work adjustment processes. The research integrates insights from work adjustment theory to comprehensively understand how these workers navigate technological changes. It also emphasizes the significance of considering access to technology and its impact on employee well-being, business practices, and health and safety outcomes within the cleaning industry.

The overall purpose of the study is to investigate the experiences of lower SES workers with limited formal education and training opportunities in integrating new technologies into their work environments. This study builds upon the work of scholars such as Shim et al., 2022 in their phenomenological examination of meaningful work experiences of low SES employees. By expanding this current body of knowledge through exploring the unique challenges of cleaning industry low SES workers and their adaptation strategies to new technology, as well as the effects of technological transitions on their work adjustment processes, the study aims to provide comprehensive insights informed by work adjustment theory. Additionally, it seeks to highlight the significance of considering access to technology for employee well-being, business practices, and health and safety outcomes within the cleaning industry. This will be accomplished through answering the following the research question:

1) What are the lived/career experiences of janitors and managers in adapting to technological shifts in the cleaning industry?

3.2. Research Paradigm

Constructivist researchers believe that there is a constructed reality that is based on experiences, circumstances, and situations (Adom et al., 2016; Pilarska, 2021). The reality is not a single reality and therefore the generalizability of one outcome to other similar situation is difficult. To study a phenomenon, you need to know about the situation that influenced it. Every phenomenon is different due to the situation which caused it to happen. The approach to solve problem is usually subjective and qualitative. Phenomenology is rooted in the philosophy of phenomenology, which emphasizes the study of conscious experiences from the perspective of the individual (Pilarska, 2021). As a result, the constructivist paradigm represents a fundamental perspective within phenomenological research studies, offering a lens through which researchers approach the exploration and interpretation of human experiences. Rooted in the philosophical tenets of constructivism, this paradigm emphasizes the subjective construction of reality and meaning by individuals within their social and cultural contexts. In the context of phenomenological research, the constructivist paradigm acknowledges that individuals actively construct and interpret their lived experiences, shaping their perceptions, beliefs, and understandings of the world around them (Adom et al., 2016; Pilarska, 2021).

Central to the constructivist paradigm is the notion that reality is not an objective entity external to individuals but is rather co-constructed through interactions between individuals and their social environments. Within phenomenological research, this perspective underscores the importance of understanding the subjective experiences of individuals and the meanings they attribute to these experiences (Yüksel, & Yıldırım, 2015). Researchers adopting the constructivist paradigm aim to explore how individuals make sense of their lived experiences, recognizing that these interpretations are influenced by their unique perspectives, cultural backgrounds, and social

contexts.

In phenomenological research studies grounded in the constructivist paradigm, researchers employ qualitative methods to investigate the rich and complex nature of human experiences (Shim et al., 2022). Through approaches such as semi-structured interviews, participant observation, and in-depth analysis of textual data, researchers seek to uncover the multiple layers of meaning embedded within individuals' lived experiences (Yüksel, & Yıldırım, 2015). The focus is not on uncovering objective truths or universal laws but rather on elucidating the diverse ways in which individuals construct and understand their realities. Furthermore, the constructivist paradigm in phenomenological research emphasizes the importance of reflexivity and researcher subjectivity. Researchers acknowledge their role in shaping the research process and recognize that their own perspectives, biases, and interpretations may influence the data collection and analysis process. By engaging in reflexivity, researchers critically examine their assumptions and preconceptions, striving to remain open to the diverse perspectives and interpretations of research participants (Yüksel, & Yıldırım, 2015).

Overall, the constructivist paradigm is a foundational framework within phenomenological research studies, highlighting the subjective construction of reality by individuals within their social and cultural contexts (Adom et al., 2016; Pilarska, 2021). By embracing this perspective, researchers aim to explore the rich tapestry of human experiences, acknowledging the diverse meanings and interpretations individuals attribute to their lived experiences. Through qualitative methods and a commitment to reflexivity, researchers within the constructivist paradigm seek to illuminate the complexities of human existence and contribute to a deeper understanding of the subjective nature of reality (Adom et al., 2016; Pilarska, 2021).

3.3. Research Design

Qualitative research methods are valuable in providing rich descriptions of complex phenomena; tracking unique or unexpected events; illuminating the experience and interpretation of events by populations with widely differing stakes and roles; giving voice to those whose views are rarely heard; conducting initial explorations to develop theories and to generate and even test hypotheses; and moving toward explanations (Shim et al., 2022; Yüksel, & Yıldırım, 2015). There are times when a qualitative approach is a better fit for the research needs and questions (Creswell et al., 2007; Creswell & Clark, 2004). Qualitative research methods play a crucial role in addressing certain research questions and phenomena that may not be well-defined or easily quantifiable. This essay explores the significance of qualitative research in various contexts, highlighting its value in exploring complex issues, understanding contextual factors, providing explanations, and addressing measurement challenges. Qualitative methods are particularly valuable when researchers seek to explore phenomena that are not clearly defined or understood (Yüksel, & Yıldırım, 2015). For instance, in a qualitative study, researchers can delve into the problems participants may encounter, uncover needs that participants may have but cannot articulate, or investigate misunderstandings participants face in certain situations (Shim et al., 2022). By allowing for in-depth exploration and capturing nuanced experiences, qualitative research enables researchers to gain insights that may be overlooked in quantitative approaches (Bevan, 2014).

In addition to exploring undefined phenomena, qualitative research excels in describing the complexity and subtlety of human interactions with products or in accomplishing goals. While complicated problems can be quantified to some extent, qualitative research provides a means to distill complexity into more manageable parts (Yüksel, & Yıldırım, 2015). By examining the intricacies of user experiences and behaviors, qualitative research offers a deeper understanding

of how individuals interact with products and navigate complex situations (Bevan, 2014). Understanding the context and environment in which users operate is essential for informing product direction and design. Qualitative research allows researchers to explore the broader context surrounding user experiences, including the products, places, people, and challenges they encounter. Unlike contrived lab settings, qualitative data collected through in-person observations and interactions provides rich insights into the real-world context in which users engage with products or services. Qualitative methods are valuable for providing explanations and uncovering the underlying mechanisms or linkages that drive certain behaviors or outcomes (Yüksel, & Yıldırım, 2015).

Finally, qualitative research is instrumental in addressing measurement challenges that arise when traditional measures do not adequately capture the complexity of human experiences or interactions (Creswell & Poth, 2018). While there are established methods for measuring usability, many interactions may be difficult to quantify. Qualitative data allows researchers to observe users as they navigate challenges and probe into the underlying issues, ultimately guiding the identification of relevant measures and metrics. Overall, qualitative research methods offer unique advantages in exploring complex phenomena, understanding contextual factors, providing explanations, and addressing measurement challenges. By embracing qualitative approaches alongside quantitative methods, researchers can gain a comprehensive understanding of human experiences and behaviors, ultimately contributing to more informed decision-making and product development processes.

3.4 Phenomenological Research Design

The current study utilized a phenomenological research approach. Phenomenological research focuses on exploring and understanding the lived experiences of individuals who have

experienced a shared phenomenon of interest (Bevan, 2014; Nowell et al., 2017; Shim et al., 2022). For the current study, the shared phenomenon under investigation revolves around the experiences with technological advances and changes for employees in cleaning and janitorial industry segments. Through the use of phenomenological research, the aim of the study was to uncover the essence or nature of this phenomenon as it was perceived by the participants. Overall, phenomenological qualitative research differs from other qualitative approaches in its focus, goals, and philosophical underpinnings and is uniquely appropriate as the methodological approach for the current study.

Rooted in the philosophical tradition of phenomenology, particularly influenced by thinkers like Edmund Husserl and Martin Heidegger, this approach seeks to uncover the essence of a specific phenomenon as it is subjectively perceived by participants (Bevan, 2014). The central focus revolves around capturing the underlying structures and meanings of these experiences, aiming to provide a deep and holistic understanding. Researchers employing phenomenology engage in a rigorous process of bracketing, where they consciously set aside their own preconceptions and biases to better grasp the participants' perspectives without undue influence (Creswell & Poth, 2018; Shim et al., 2022). The primary method of data collection often involves in-depth interviews, encouraging participants to articulate their experiences in rich detail. The resulting phenomenological description provides a nuanced portrayal of the phenomenon's essence, emphasizing the universal aspects shared among participants (Bevan, 2014).

One distinctive feature of phenomenological research is its commitment to uncovering the commonalities and essential themes present in diverse individual experiences (Creswell et al., 2007). The analysis goes beyond surface-level observations, seeking to reveal the fundamental structures that shape the phenomenon under investigation. Phenomenologists are interested in the

intrinsic nature of the experiences rather than establishing causal relationships or generalizing findings to broader populations (Bevan, 2014). This approach recognizes the uniqueness of each participant's perspective while aiming to identify shared patterns that contribute to a more comprehensive understanding of the phenomenon. Phenomenological research outputs are often characterized by narrative descriptions that capture the richness and depth of the lived experiences, providing valuable insights into the subjective dimensions of human phenomena.

Phenomenological qualitative research differs from a case study approach in its focus and Purpose (Creswell & Poth, 2018). While both approaches involve an in-depth exploration of a particular phenomenon, phenomenology aims to uncover the essence of the lived experiences associated with the phenomenon. It seeks to identify the fundamental structures and meanings that characterize these experiences, emphasizing the subjective perspective of individuals. In contrast, a case study approach typically investigates a specific instance or case in detail, often with the goal of understanding the unique context and complexity of that particular case. While case studies provide rich contextual information, phenomenology is more concerned with universal aspects of human experiences.

In comparison to a narrative approach, phenomenological research diverges in its emphasis on uncovering the essence of a phenomenon rather than constructing a cohesive narrative (Creswell & Poth, 2018). While narratives involve storytelling and the construction of a chronological sequence of events, phenomenology aims to identify the underlying structures and meanings inherent in individual experiences. Phenomenologists seek to capture the essential themes that transcend individual narratives, focusing on the core elements that define the phenomenon (Nowell et al., 2017). The narrative approach, on the other hand, may prioritize the storytelling aspect and the subjective interpretation of events within a broader context.

Contrasting with grounded theory, phenomenological research differs in terms of its analytical focus and research goals. Grounded theory aims to develop theories grounded in data, often exploring relationships and patterns that emerge during the analysis (Creswell et al., 2007). Phenomenology, in contrast, is not primarily concerned with theory development or causal relationships. Instead, it seeks to provide a thorough understanding of the lived experiences surrounding a phenomenon, emphasizing the essence and meaning of those experiences. While grounded theory looks for explanatory frameworks, phenomenology concentrates on the intrinsic nature of the phenomenon as subjectively experienced by individuals (Creswell et al., 2007).

In comparison to ethnography, phenomenological research stands out in its focus on the individual's subjective experiences rather than the cultural context. Ethnography involves the study of cultures and communities, exploring patterns of behavior, rituals, and social structures within a particular cultural setting (Creswell & Poth, 2018). Phenomenology, on the other hand, prioritizes the exploration of the essence of individual experiences, aiming to uncover commonalities among diverse perspectives (Nowell et al., 2017). While both approaches contribute to qualitative understanding, ethnography emphasizes the sociocultural context, while phenomenology delves into the depth of personal experiences, often transcending cultural boundaries.

3.5. Participants

3.5.1 Sampling Frame

In qualitative research, a sampling frame refers to a delineated set of potential participants or cases from which the researcher intends to select a sample (Nowell et al., 2017). Unlike in quantitative research where sampling frames are often well-defined lists or databases, qualitative research sampling frames may take various forms depending on the nature of the study. The sampling frame serves as a starting point for the researcher to identify and select individuals,

groups, or cases that are relevant to the research question.

3.5.2 Sampling Method

In order to align with the research purpose and effectively answer the research question, this study employed both purposeful and convenience sampling procedures (Acar, 2018). Previous studies concerned with examining the lived experiences of labor intense occupations have employed both purposeful and convenience sampling procedures (Acar, 2018). Purposeful sampling and convenience sampling are two distinct strategies employed in phenomenological research to select participants based on specific criteria that align with the research goals (Devers & Frankel, 2000; Tuckett, 2014). Purposeful sampling is a deliberate and intentional selection of participants who possess the characteristics or experiences relevant to the phenomenon under investigation (Robinson, 2014). This approach ensures that participants can provide rich and meaningful insights into the essence of the phenomenon. Researchers carefully choose individuals who have firsthand experience with the phenomenon, allowing for a focused exploration of the unique aspects of interest (Creswell et al., 2007). Purposeful sampling is particularly useful in phenomenology as it helps capture the diversity of perspectives and ensures that participants can contribute in-depth information that aligns with the research objectives. This strategy enhances the depth and relevance of the findings, contributing to a more comprehensive understanding of the phenomenon.

Convenience sampling, on the other hand, involves selecting participants based on their easy accessibility or availability. While this method may seem less rigorous, it can be practical in certain research contexts, especially when time and resources are limited (Creswell et al., 2007). Convenience sampling is often employed when researchers aim to gather preliminary insights into a phenomenon or when reaching a specific population is challenging (Creswell & Poth, 2018). In

phenomenological research, convenience sampling may be appropriate in exploratory studies where the goal is to gain initial perspectives on a phenomenon before conducting more in-depth investigations (Nowell et al., 2017). While it may not provide the same level of depth as purposeful sampling, convenience sampling can still offer valuable insights and serve as a starting point for further research.

The objective of purposeful sampling in phenomenological research is to ensure a targeted and focused exploration of the phenomenon by selecting participants with specific characteristics or experiences relevant to the study (Creswell et al., 2007). This approach contributes to the depth and richness of the data collected, allowing researchers to uncover the essence of the phenomenon through diverse perspectives. Conversely, convenience sampling serves a more practical purpose by providing a quick and accessible way to gather preliminary insights (Nowell et al., 2017). While it may not offer the same level of specificity as purposeful sampling, convenience sampling can be valuable in certain research contexts where feasibility and efficiency are crucial considerations (Creswell et al., 2007). Ultimately, the choice between purposeful and convenience sampling depends on the research goals, available resources, and the desired depth of exploration in phenomenological research.

3.5.3 Sample

A breakdown of participant demographics is provided in table 1. The participants in this study all worked in the cleaning and/or janitorial industry as cleaners. These individuals predominantly came from lower-income and less-educated backgrounds and many of the participants have faced socioeconomic challenges and limited educational opportunities. It was evident from the demographic and descriptive data collection process that the participants come from families where manual labor is typically commonplace, and as a result, the participants had

largely been socialized to view this type of labor as a means of supporting themselves and their loved ones. Participants in this study are immigrants or come from immigrant families. The participants shoulder significant financial responsibilities, with each being responsible for roughly 3-5 other people, including children and parents, back home in their home countries

Table 1
Study Participant Demographics

Participant #	Sex	Age	Ethnicity/Race	(region – through school-aged years)	Highest level of education	Years of experience
Participant 1	F	52	Black/Latin	Colombia	High school	2
Participant 2	F	53	Indian descent	Guyana	Primary School	4
Participant 3	F	35	Latin	Nicaragua	College (half way through her Tourism Management BSc. Degree)	3
Participant 4	F	33	Black/Latin	Honduras	Primary School	2
Participant 5	F	48	Black	Jamaica	Primary School	1.5
Participant 6	F	39	Black	Jamaica	Primary School	1
Participant 7	F	36	Black	Jamaica	High school	6
Participant 8	F	31	Black	Jamaica	High school	2
Participant 9	M	29	Black/Latin	Nicaragua	Master's degree (MBA)	10

3.6 Instrumentation

For phenomenological research, it is important to provide the participants with the opportunity to openly and freely share their experiences, while minimizing the number of targeted and structured questions being asked (Creswell et al., 2007; Devers & Frankel, 2000; Tuckett, 2014). For this reason, a semi-structured interview guide is considered a valuable tool in qualitative research, offering a balance between structure and flexibility (Devers & Frankel, 2000). A semi-structured interview guide consists of a pre-planned set of open-ended questions and prompts designed to guide the interview process (Creswell et al., 2007; Kallio et al., 2016). The use of semi-structured interview guides featuring open-ended questions is paramount in phenomenological research procedures for enhancing reliability. By providing a flexible yet

systematic framework for data collection, encouraging authentic participant responses, and facilitating iterative exploration of the phenomenon, this methodological approach promotes consistency, credibility, and trustworthiness in the research outcomes. Unlike fully structured interviews with a fixed set of standardized questions or unstructured interviews with no predetermined questions, a semi-structured approach combines elements of both. The guide includes open-ended questions that encourage participants to express their thoughts, experiences, and perspectives in their own words, fostering rich and detailed responses. Importantly, it allows for flexibility, enabling the interviewer to probe further, ask follow-up questions, and explore unexpected areas based on the

participant's responses.

The guide was organized around key themes and topics relevant to the research objectives and question, which provides a framework for the interview while at the same time allowing participants to introduce new ideas or perspectives. This approach ensures consistency across interviews, making it easier to compare and analyze data, while also being sensitive to the context and allowing participants to share their experiences within their own frameworks (Creswell et al., 2007). Free-form and not governed by simple one-word answers (e.g., yes or no responses), open-ended questions allow respondents to answer in open-text format, giving them the freedom and space to answer in as much (or as little) detail as they like. Open-ended questions help you to see things from the respondent's perspective, as you get feedback in their own words instead of stock answers (Braun & Clark, 2006). Also, as you're getting more meaningful answers and accurate responses, you can better analyze sentiment amongst your audience.

Additionally, in the context of phenomenological inquiry, the use of semi-structured interview guides featuring open-ended questions holds significant importance for ensuring

reliability in the research procedures (Creswell & Poth, 2018). Reliability refers to the consistency and dependability of research findings, and employing appropriate methodologies is essential to enhance the reliability of the study outcomes. From this standpoint, the utilization of semi-structured interview guides with open-ended questions served several crucial purposes and ultimately contributed to the overall reliability of the study (Creswell et al., 2007).

Semi-structured interview guides provide a flexible yet systematic framework for Conducting interviews, allowing the exploration of the phenomenon of interest, cleaning workers experiences adapting to new technology, while maintaining a level of consistency across participants (Nowell et al., 2017). By incorporating open-ended questions, participants are afforded the freedom to express their experiences, perspectives, and interpretations in their own words, without being constrained by predetermined response options from close-ended questions. This approach encourages rich and detailed responses, enabling researchers to gain a deep understanding of the phenomenon under investigation. Moreover, the semi-structured nature of the interview guide ensured that key topics and themes relevant to the research objectives were covered across all interviews, promoting consistency in data collection procedures (Nowell et al., 2017).

Furthermore, the use of open-ended questions in semi-structured interviews aligns with the principles of phenomenological research, which emphasize the exploration of subjective experiences and meanings attributed to phenomena (Nowell et al., 2017). Open-ended questions allow participants to articulate their lived experiences and perceptions authentically, without imposing predefined categories or interpretations that may limit the richness of the data. This methodological approach fosters a holistic and nuanced understanding of the phenomenon, thereby enhancing the credibility and trustworthiness of the research findings (Creswell et al., 2007;

Creswell & Poth, 2018). Additionally, the semi-structured nature of the interview guide enables researchers to adapt and refine their questioning strategies based on emerging themes and insights gathered from previous interviews (Creswell et al., 2007). This iterative process of data collection and analysis promotes methodological rigor and ensures that the research remains responsive to the nuances and complexities of the phenomenon being studied. By allowing for flexibility and responsiveness in the interview process, semi-structured interview guides with open-ended questions contribute to the reliability of the research by facilitating thorough and in-depth exploration of the phenomenon from multiple perspectives.

INTERVIEW GUIDE:

Part 1: Demographic Information:
Sex
Age
Ethnicity/race
Location (region – through school-aged years)
Highest level of education
Years of experience
- *You will want to keep this all associated with the actual speaker and keep track of which participant is linked to these demographics.*

Part 2: Interview Questions:
Descriptive:

1. *Describe your overall educational experiences:*
   a. *What were your favorite courses/classes?*
   b. *What tools (textbooks, pencils, pens, calculator, computer, printer) did you use the most to do your work/finish assignments?*
   c. *How these experiences relate to your current work*
2. *What technology do you have access to in your daily life?*
   a. *Applications, devices, wifi, etc.*

Core Questions:

1. Describe your previous experiences (opinions/perceptions of) with technology.

- *In your daily life*
- *Growing up*
- *In your job*
- *(In education)*

2. *Describe how you have been adapting to technological shifts in your workplace.*
3. *Describe how your roles and responsibilities have evolved due to technological changes?*

- *Why did you feel that way about X change…*

4. *Describe how you have been adapting to technological shifts in your workplace.*

- *How have technological changes impacted the job satisfaction?*
- *How have technological changes impacted your commitment to this occupation?*
- *Experiences (or lack of) with training*

5. *Describe what you think the future looks like when it comes to continued advancements in technology and this industry.*

3.7 Data Collection Procedure

For the current study, the data collection process involved the use of a focus group approach. A focus group approach within phenomenological data collection offers several advantages in capturing rich and diverse perspectives on a particular phenomenon. First, focus groups allow for interaction and exchange among participants, fostering a dynamic discussion that can elicit deeper insights into individual experiences (Krueger & Casey, 2009). As participants share their experiences and perspectives, they may build upon each other's responses, leading to a more nuanced understanding of the phenomenon under study (Morgan, 1997). This interactive nature of focus groups facilitates the exploration of diverse viewpoints and the identification of common themes or patterns across participants' experiences (Kitzinger, 1994).

Importantly, focus groups provide a supportive environment for participants to express their thoughts and feelings openly (Stewart et al., 2007). The presence of peers in the group setting can create a sense of camaraderie and validation, encouraging participants to share personal experiences that they might not feel comfortable disclosing in a one-on-one interview (Kitzinger, 1994). This group dynamic can also help participants feel less isolated in their experiences, leading to greater engagement and willingness to discuss sensitive topics (Krueger & Casey, 2009). By

leveraging the social context of the focus group, researchers can access a broader range of perspectives and uncover deeper insights into the lived experiences of participants (Barbour, 2007).

Furthermore, focus groups offer researchers the opportunity to observe nonverbal cues and interactions among participants, providing additional layers of information beyond verbal responses alone (Morgan, 1997). Researchers can analyze participants' body language, gestures, and facial expressions to gain insights into their emotional reactions and attitudes toward the phenomenon being studied (Kitzinger, 1994). This holistic approach to data collection allows researchers to capture the nuances of participants' experiences and explore the underlying meanings behind their verbal and nonverbal communication (Barbour, 2007). Overall, the focus group approach enhances the depth and richness of phenomenological data collection by facilitating interactive discussions, creating a supportive environment for sharing, and capturing both verbal and nonverbal expressions of participants' experiences (Stewart et al., 2007).

Through the focus group data collection design, the data collection procedure for this study involved a systematic approach to ensure a comprehensive understanding of participants' experiences working in the field of janitorial services. Upon arrival, participants were greeted and offered refreshments to create a comfortable and welcoming atmosphere. The classroom setup was arranged to facilitate face-to-face interaction between participants and the interviewer, promoting open communication. The interviewer, equipped with necessary tools for data collection, including a notebook, pen, iPhone with an extra mic for recording, and a MacBook as a backup recording device, ensured that the recording process would proceed smoothly.

Before commencing the recording, participants were provided with a brief overview of the purpose of the meeting to establish context. Additionally, they were informed about the expected

conduct during the recording session, emphasizing the importance of maintaining order and allowing each participant to share their thoughts without interruption. Maslow's hierarchy of needs was addressed to ensure participants' basic needs, such as restroom breaks and access to beverages, were met before proceeding. During the recording, participants were asked a series of questions stemming directly from the semi-structured interview protocol which related to their experiences working in janitorial services.

Throughout this process, the researcher facilitated the conversation, ensuring that only one participant spoke at a time and encouraging each participant to share their perspectives fully (Creswell & Clark, 2004). While participants responded to the questions, the interviewer took detailed notes of their responses and any important insights from the dialogue. Once all participants had completed the series of questions, they were invited to share any additional information or insights they thought might be necessary. This open-ended discussion allowed for further exploration of relevant topics and ensured a comprehensive data collection process (Nowell et al., 2017). Following these data collection steps, the researcher recorded any additional information provided by participants and concluded the data gathering phase. Upon the completion of the data collection process, participants were thanked for their participation, and they were encouraged to continue enjoying the refreshments provided. The recording of the session was then uploaded to a third-party transcription service for accurate and thorough transcription of the data collected, ensuring that all insights and perspectives shared by participants were captured and analyzed effectively.

3.8 Data Analysis

Thematic analysis, as a standalone qualitative descriptive approach, is commonly defined as "a method for identifying, analyzing, and reporting patterns (themes) within data" (Braun &

Clarke, 2019, p. 79). It is also recognized as a foundational qualitative descriptive method that equips researchers with essential skills for conducting various other forms of qualitative analysis. Consequently, researchers are encouraged to familiarize themselves with thematic analysis as both an independent and reliable qualitative approach to data analysis. Thematic analysis involves the systematic identification of patterns or themes within qualitative data. Braun & Clarke (2019) assert that it serves as a foundational method that provides core skills applicable across a range of qualitative analysis approaches. Moreover, thematic analysis offers distinct advantages, particularly in the context of learning and teaching, as it is considered a method rather than a methodology (Braun & Clarke 2019; Sundler et al., 2019). Unlike many qualitative analysis procedures, thematic analysis is not bound to a specific epistemological or theoretical framework, making it highly adaptable and flexible. Specifically, thematic Analysis (TA) is a method for identifying and analyzing patterns of meaning in a dataset (Braun & Clarke, 2019). It provides the researcher with a mechanism by which to illustrate which themes are important in the description of the phenomenon under study (Daly et al., 1997; Sundler et al., 2019). The end result of a thematic analysis seeks to highlight the most salient meanings present in the entire dataset.

From a historical development perspective, thematic analysis is rooted in the older tradition of content analysis (CA). TA shares many of the principles and procedures of CA, a historically quantitative tradition that dates back to the early 20th century within the social sciences, but further back in the humanities (Sundler et al., 2019). CA involves establishing categories and then counting the number of instances in which they are used in a text or image. It determines the frequency of the occurrence of particular categories. Many content analyses rely purely on counting attributes in data (e.g. particular words or images). CA is appealing because it offers a model for systematic analysis of both elicited and naturally occurring data. It has been widely used

for the analysis of mass media material. However, the results it generates have been judged as `trite' (Silverman, 1993) when they rely exclusively on the frequency outcomes it generates. It is also accused of removing codes from their context, thereby stripping data of its meaning. The concept of 'thematic analysis' was developed, in part, to go beyond observable material to more implicit, tacit themes and thematic structures (Merton, 1975). For the founder of thematic analysis, Gerald Horton, such material can be termed 'themata' and these tacit preferences or commitments to certain kinds of concepts are shared in groups, without conscious recognition of them.

Thematic analysis can be effectively incorporated into qualitative phenomenological research to identify and analyze patterns of meaning within the data, enriching the understanding of lived experiences. Braun & Clarke (2019) offer a six-phase guide that serves as a valuable framework for conducting qualitative analysis which was employed within this study. The first phase involved becoming familiar with the data by thoroughly reading and re-reading the transcripts to gain a comprehensive understanding of the entire data corpus. During this stage, it is beneficial to make notes and jot down initial impressions, and this was accomplished during the review process. In the second phase, the data is organized in a meaningful and systematic way through the process of coding, which involves condensing large amounts of data into smaller, manageable chunks of meaning. Moving to the third phase, the process involved a search for themes within the data that capture significant or interesting patterns related to the research question. There are no strict criteria for identifying themes, but they are characterized by their significance. The fourth phase entails reviewing, modifying, and developing preliminary themes identified in the previous step. Researchers gather relevant data for each theme and may utilize qualitative data analysis software to streamline the process. During the fifth phase, themes are refined further to identify their essence and how they interact with each other, including any

subthemes. Finally, in the sixth phase, the findings are synthesized and presented in a report format, typically as a journal article or dissertation. This structured approach facilitates a thorough and systematic analysis of qualitative data, ensuring that the insights gleaned from the research are effectively communicated.

The process of thematic analysis within a phenomenological framework involves these same key steps. Initially, researchers engage in a thorough familiarization with the data, often obtained through in-depth interviews or other qualitative methods (Creswell et al., 2007). This immersion allows them to gain a comprehensive understanding of the participants' descriptions of their experiences. Following familiarization, the researcher moves on to generating initial codes, identifying and labeling meaningful segments within the data. In phenomenological research, these codes are often related to the essential themes or aspects of the phenomenon under study (Creswell & Clark, 2004). The aim is to capture the diverse ways participants express their experiences and to highlight the recurring patterns that contribute to the essence of the phenomenon. The coding process involves maintaining a balance between staying close to the participants' own language and concepts while organizing data into meaningful units.

For the current analysis procedures, once the initial codes were established, the next step involved grouping them into broader themes (Creswell & Clark, 2004). Thematic analysis in phenomenological research aims to uncover the fundamental structures and meanings inherent in the participants' experiences and the resultant themes should reflect the core aspects of the phenomenon's essence, providing a deeper understanding beyond surface-level descriptions (Nowell et al., 2017). To accomplish this in the current analysis procedures, the researcher engaged in constant comparison, refining and revisiting themes to ensure they accurately represent the essential features of the lived experiences. Finally, the last step involved articulate the findings in

a coherent and comprehensive manner through the results writeup. The thematic analysis results have been displayed in a detailed narrative that presents the identified themes and their interconnections, offering a rich portrayal of the essence of the phenomenon (Creswell & Clark, 2004). This narrative has been structured in a way that is based on the emergent patterns from the perceptions of the participants. Throughout this process, maintaining transparency and reflexivity was crucial, acknowledging the researcher's influence and biases (Creswell & Poth, 2018). Thematic analysis within a phenomenological framework adds a layer of depth to the exploration of lived experiences, facilitating a nuanced understanding of the essence of the phenomenon through the identification and interpretation of meaningful themes (Creswell & Poth, 2018).

3.9 Trustworthiness

Ensuring trustworthiness in phenomenological research is crucial to maintain the rigor and credibility of the findings (Adler, 2022). In this section, the strategies used for achieving trustworthiness in the current study, using a thematic analysis approach, are outlined and expanded upon.

Credibility

To enhance credibility, the researcher engaged in prolonged engagement and persistent observation to develop a deep understanding of participants' experiences (Creswell & Poth, 2018). This involved spending sufficient time with participants through the use of a focus group, actively listening to their narratives, and becoming immersed in the data to capture the richness and complexity of the phenomenon.

Confirmability

Confirmability refers to the objectivity and neutrality of the research findings, ensuring that they are grounded in participants' experiences rather than researchers' biases or

preconceptions. The researcher enhanced confirmability by maintaining an audit trail, and by documenting the research process, decisions made during data analysis, and reflexive journaling to acknowledge and address biases (Nowell et al., 2017).

Transferability

Transferability involves demonstrating the applicability and relevance of the research findings to other contexts or populations. To accomplish this, detailed descriptions of the research context were provided through the review of literature and theoretical framework, as well as participant characteristics, and data collection procedures to allow readers to assess the transferability of the findings to similar settings (Lincoln & Guba, 1985). Additionally, transferability has been enhanced by including rich, thick descriptions of participants' experiences in the results sections.

Dependability

Dependability refers to the consistency and stability of the research findings over time and across different researchers. To enhance dependability, researchers should employ a systematic and transparent data analysis process, clearly documenting the steps taken and decisions made during data coding and theme development (Nowell et al., 2017). Peer debriefing and member checking can also contribute to establishing the dependability of the findings by allowing participants to verify the accuracy and authenticity of the interpretations (Creswell & Poth, 2018). Overall, achieving trustworthiness in phenomenological research using a thematic analysis approach requires researchers to establish credibility through prolonged engagement, maintain confirmability by documenting the research process, enhance transferability by providing rich descriptions of participants' experiences, ensure dependability through systematic data analysis and member checking, and engage in reflexivity to critically examine their own biases and

assumptions.

4.0 Chapter 4 - Results and Findings

The results section of this paper presents a comprehensive overview of five key themes that emerged from the qualitative analysis of participant narratives. These themes provide insights into the participants' experiences and perspectives regarding the integration of technology in the cleaning service industry. Participants shared diverse perspectives on their interactions with technology, reflecting on their experiences growing up, in their personal lives, and within the cleaning profession. There was variability in participants' definitions and utilization of technology, with some highlighting minimalistic approaches primarily relying on cell phones for administrative tasks, while others embraced a wide range of technological tools for both work-related and personal purposes. The theme highlights participants' evolving understanding and adaptation to technological advancements, as well as the challenges and benefits associated with increased access to technology over time.

The integration of technology in the workplace was associated with increased job satisfaction among participants. They expressed enjoyment and satisfaction in adapting to new technologies, recognizing the positive impact on efficiency, productivity, and overall satisfaction in their roles. Participants emphasized the value of embracing technological advancements, which facilitated easier communication, streamlined task completion, and ultimately contributed to a more fulfilling work experience. Participants demonstrated a conscious adaptation to technological changes within the cleaning service industry, navigating shifts in job roles, duties, and responsibilities. They acknowledged the necessity and inevitability of adapting to technological advancements, reflecting on the dynamic nature of their job requirements and the increased reliance on technology to perform tasks efficiently. Participants' narratives underscored the

multifaceted nature of adaptation to technological changes, encompassing conscious adaptation, dynamic job duties, and increased responsibilities associated with technological evolution.

The integration of technology in cleaning tasks resulted in job quality improvements, including the reduction of intense manual labor, enhancements in task quality, and improvements in the health and safety of cleaners. Participants highlighted the positive impact of technological advancements, particularly the utilization of robots, in streamlining operations and improving overall job quality. They expressed optimism about the potential contributions of technology to easing physical demands and enhancing efficiency in their roles. Participants exhibited a cautious optimism regarding the integration of technology advancements in the cleaning service industry. While recognizing the benefits of improved efficiency, some expressed concerns about job security, resistance to change, and uncertainty about the long-term implications of technology. Participants' narratives revealed complex emotions surrounding the integration of technology, characterized by a blend of hope for improved efficiency alongside concerns about job security and skepticism about the long-term implications of technological advancements.

Overall, the thematic analysis of participant narratives provides valuable insights into the multifaceted experiences and perspectives of cleaners regarding the integration of technology in the cleaning service industry. The following sections will delve into a detailed discussion of each theme, presenting participant quotes and elaborating on key findings to provide a comprehensive understanding of the results.

Table 2.
Themes and Sub-Themes

Theme	Sub-themes
Technology Socialization Differences	Inconsistency with defining technology
	Differences in socialization related to technology
	Differing needs in technology use throughout life

Theme	Sub-themes
	Overall inconsistency with knowledge about technology across employees
	Lack of access to technology at younger ages
	Enjoying adapting to new technology
	Higher Job Satisfaction
Increased Job Satisfaction	Embraced making job more efficient/easier
	Leadership responsibilities improved by technology
	Higher quality of work
	Necessity for job to keep up with technology changes
	Consciously Adapting to technology changes overall
Adaptation to Changes	Adapting to changing job duties due to technology
	No choice but to adapt to technology change
	Greater job responsibilities require higher technology use
	Technology meant less intense work
	Less intense manual labor
	Job task quality improved
	Health Safety of Cleaners Improved
Job Quality Improvements	Robots and robot use embraced
	Accepting of new technology
	Excited by new technology
	Excited by future technology change
	Fear of being replaced by new technology
	Threat of job security
Cautious Optimism	Conflicted with what new technology might mean long-term
	Resistance to technology change

4.1 Theme 1: Technology Socialization Differences

The participants in this study provided diverse perspectives on their interactions with technology in the context of their time growing up, current personal lives, as well as their time

within the cleaning profession. Participants shared conflicting understandings and experiences with technology beginning at young ages. Overall, there was a general inconsistency with what the participants felt constituted technology in their own lives as well as their work. Participant 8 highlighted the limited role of technology in their work, stating, "Well, in my job we don't really use technology like that to work but only with chemicals." However, participant 8 did acknowledge the convenience of using cell phones for communication with staff members, indicating, "well through cell phone we communicate with office and with staff so that make it a little easier for us." Further, participant 7 reflected on their evolving understanding of technology, noting a shift from naivety to a better comprehension of technological tools over time. Participant 7 stated, "back then I was naive to technology, not understanding much, but being where I am now, I understand technology easier than [I did] then."

Participant 4 described a minimalistic approach to technology utilization at work, primarily relying on cell phones for administrative tasks such as clocking in and out. They mentioned, "Well technology will just be my phone, otherwise I only do office mid service so it basically in the mid service it's only vacuum. That's the only technology that I use from there in the cell phone." In contrast, Participant 3 elaborated on their use of smartphones and smartwatches not only for work-related communication but also for personal health monitoring. They stated,

> I mentioned that I had a cell phone also I have a smartphone even watching smartwatch. Sorry. And what I can say is that it also help us because we can, technology is not just for cleaning industry, also for our health because this help us to monitor our walking basis, blood pressure, et cetera. A lot of things.

Participant 2 demonstrated inconsistencies in defining technology and its application at work, showcasing a limited understanding of its potential beyond basic functions like clocking in. They expressed, "When I was growing up, I didn't have a phone but now I have one so Excellent." Additionally, it appeared P2 was inconsistent with understanding what counted as technology in

the workplace. They shared thoughts specific to their cell phone use, "I use it to clock in when I'm at work and clock out and that's it. I just put my phone down. Anybody want to call me? They have to call my coworkers. I don't like to use phone wise working."

Participant 1 shared experiences of adapting to technological advancements, expressing occasional challenges in integrating technology into their work routine, particularly in comparison to their earlier experiences with less advanced technology. They stated,

> Well back home I used to work in immigration. So, in immigration I used to use the computer and the phone. Well, the phone is not advanced like how it's now, but I used to use it both thing now everything getting advanced, the technology getting more bigger and bigger in one part it's not bad but it getting, we like certain things we getting too adapted to the computer, to the phone so we getting kind slow in certain things.

Conversely, Participant 9 (P9) recounted a comprehensive journey with technology, from childhood curiosity to professional utilization in call centers and financial technology companies. They shared, "Calculator, pen, pencil, books. I had access to a desktop as well up until my primary school. And then in high school I got a laptop as well." Additionally, they mentioned, "I would say I was always curious about technology, especially when it comes to computers. So I guess my parents got that very early and they got me a desktop first. Then they sent me the different courses, computer courses, computer repair, and basic computer operator… So I got started quite early, I would say with the use of technology."

Importantly, the participants also shared their experiences of growing up with limited access to technology, highlighting the challenges they faced in accessing modern technological tools. Participant 8 reminisced about the difficulties of growing up without easy access to technology, recalling, "growing up with technology was a bit difficult, but now it's easier because access to television." They reflected on the past, mentioning, "Back then it was a bit hard. Sometime you have to pass and glimpse like a neighbor tv." However, they noted the significant

shift in accessibility over time, expressing, "Now you sitting home any direction you turn, you have a television cell phone, you have your own cell phone, computer, same laptop. So, it's easier now." Participant 3 (P3) echoed similar sentiments, emphasizing the impact of technology on their daily life while acknowledging past limitations. They stated, "Well what I can say is on my daily life is impact a lot. As we mentioned before, writing back in our country we wasn't that open to technology till certain time." This acknowledgment of historical constraints reflects a shared experience among participants.

Participant 4 and participant 6 provided insights into their experiences of transitioning from a lack of technology in their upbringing to a more technologically advanced present. P4 recalled, "Well growing up I didn't have no cell phone. Got cell phone probably when I was a teenager and ever since then it been." Similarly, P6 reflected on the limitations of earlier technology, stating, "Well before growing up just have a peanut phone, couldn't do much." However, both participants expressed appreciation for the advancements that have occurred, with P4 noting, "So right now having a cellular phone with internet can go on Google, WhatsApp and whatever you can. So, I think it's better now." Participant 5 (P5) shared a similar perspective on their childhood experiences, emphasizing their lack of exposure to technology during upbringing. They stated, "Growing up I didn't have a technology so I mean I didn't know anything about technology growing up." This sentiment underscores the common theme among participants of limited access to technology during their formative years, highlighting the transformative impact of technological advancements in their lives.

4.2 Theme 2: Increased Job Satisfaction

The second theme, increased job satisfaction, revealed itself through participant experiences related to important improvements to their work life experiences since the inclusion

of technology. The participant narratives collectively illustrated a positive connection between adapting to new technologies and experiencing higher job satisfaction. Through their experiences, they underscored the value of embracing technological advancements in the workplace, recognizing the ways in which such changes contribute to improved efficiency, productivity, and overall satisfaction in their respective roles.

The participants expressed a sense of enjoyment and satisfaction in adapting to new technologies within their workplace, emphasizing the positive impact these advancements have had on their job satisfaction. Participant 5 highlighted the benefits of embracing technological changes, stating, "It's good adapting to them because you have things now that you didn't have then." They emphasized the value of learning to use new technologies, recognizing the improvements they bring to their work environment. Participant 3 shared experiences of adapting to technology in the workplace, particularly in the context of dishwashing duties. They reflected on the transition from manual dishwashing to utilizing dishwashers, noting, "Trust me we can, we do it but the technology make it easier for us." This adaptation to technological advancements not only facilitated efficiency but also enabled them to focus more on detailed cleaning, ultimately enhancing client satisfaction. Additionally, P3 discussed using earbuds to listen to music or documentaries while cleaning, further enhancing their job satisfaction by combining technology with personal preferences.

Moreover, P9 elaborated on the role of technology in improving job performance and satisfaction. They attributed their success in their role to the experience and courses they undertook to familiarize themselves with technology, stating, "the experience that I have using the technology and the courses that I took helped me to get to that point." P9 emphasized the transformative power of technology in streamlining tasks and processing data, ultimately making their work more

efficient and enjoyable. They concluded by affirming the importance of technology in simplifying job responsibilities and enhancing overall satisfaction. Further, participant 3 noted that tech made their job more efficient and they stated,

> It impacts in a positive way because it makes our life easier, it makes my life easier. For example, if you need to make a report previously you had to make it handwriting, then make this reach to certain department, then this department send it to another one. So it make it difficult with technology we can even send an email directly to the person we want to.

Participant 8 was in agreement when they discussed their experiences with job efficiency and how easy technology made their role. They shared, "Because without technology maybe you have to write on paper letter. So, with technology you are easier to send it out to office like it's done same time, but if without technology you have to send out a meal so it'll take time."

The participants also articulated that, technological advancements facilitated communication, improving efficiency, and as a result, enhanced their overall job satisfaction. Participant 6 described how technology, particularly messaging platforms like WhatsApp and time-tracking software such as TSheet, has streamlined communication and time management in their job. They emphasized, "So it's easier now... Technology is better now using the internet." Participant 5 underscored the importance of continuous learning and adaptation to technological tools, noting how they contribute to improved efficiency and productivity. P5 expressed, "You learn day by day, the things that you need to get the job done. So having the technology, you learn to use them so you adapt to using them and it makes you work efficiently much better." Participant 2 reflected on the potential benefits of advanced technology, expressing a desire for robotic assistance in their previous role in immigration. They shared, "Well if I didn't have a vacuum I have to use the boom and the dust burn and it will take a very, very long time because immigration is very big and I wish if I could have a robot for immigration."

Participant 9 elaborated on the positive impact of technological advancements on job roles, particularly in tasks previously performed manually. P9 discussed the benefits of automated floor-cleaning robots, stating, "They always come or try to make things easier for us." Additionally, P9 emphasized the potential for technology to improve staff morale and performance, stating, "If you have a happier staff, then they'll perform better." Furthermore, P9 highlighted the broader implications of technology in streamlining operations and fostering a conducive work environment. They articulated, "Technology is a tool that makes our life easier, so it can also help us make our staff happier by improving the way that we run our operations." Additionally, P9 noted how technology alleviates pressure from manual tasks, allowing for suggestions for improvement and ultimately contributing to a positive impact on job satisfaction.

Overall, the participants expressed how technological advancements have positively impacted their job satisfaction, contributing to a more efficient and fulfilling work experience, resulting in a higher quality of work produced. Participant 8 highlighted the continuous learning aspect of their job satisfaction, noting how each new skill or task learned adds to their overall job satisfaction. They emphasized, "Okay, for my job satisfaction it has impacted my job very well because with everything you learn something new." Participant 7 discussed how the use of technology, particularly robots, has enhanced their satisfaction with their work. They elaborated on how robots are able to effectively clean areas that might be missed or difficult to reach manually, leading to increased satisfaction with the quality of work performed. P7 explained, "Okay, it has impacted the work satisfaction in a very good way... if you use the robots, the robot knows exactly that there's a hard spot there to remove it."

Participant 6 shared how technology, specifically communication apps, has improved their job satisfaction by facilitating easier communication with coworkers and supervisors. P6 noted,

"Good, because I don't have to be working to and floor, I can use the app and communicate with my coworkers and even my boss." Similarly, participant 5 described how technology, such as mobile phones, has streamlined communication and task completion, leading to increased satisfaction with work efficiency. They expressed, "It makes me feel very good because if you want something for instance, something is finished, you don't have it, you can call her on her phone... So, it makes life easier, more faster."

In addition, participant 2 expressed their desire for technological assistance in their job, particularly in tasks that are time-consuming and physically demanding. They shared their enthusiasm for the potential benefits of using robots to improve efficiency and effectiveness in their cleaning tasks, stating, "I love my job... Well, I think if I get a robot it will help me a lot to finish my job faster and the robot will do a little more better cleaning... It makes me feel good but if I get a robot I will feel much, much better." Participant 1 emphasized how technology, specifically their phone, has positively impacted their job satisfaction by keeping them informed about important events and meetings. They remarked, "Well it has a positive impact because using the phone it helped me to know a lot of things that happening inform me about things... Especially like the meeting today."

Overall, it was evident that the higher levels of job satisfaction that resulted from the use of new technologies in the workplace also led to feelings that the quality of their work was also higher. Specifically, Participant 7 stated, "You get a better work done, a job done. More satisfying in terms of human strength to that of technology." Similarly, participant 5 shared, "It has impact them well because for instance, if you have a phone now you don't have to walk. For instance, I work at a school and if I need something from my team leader, I don't have to walk down the old

school to find her. So, with technology you have a faster way to reaching that person to get what you need to do your job."

4.3 Theme 3: Adaptation to Changes

The participants in the current study shared experiences that revealed the dynamics surrounding the theme of adapting to changes concerned with technological advancements within the cleaning service industry. Participant quotes underscore various facets of this theme, including the necessity for job roles to keep up with technology changes, conscious adaptation to technological shifts, adjustments in job duties due to technological innovations, the inevitability of adapting to technological change, and the increased responsibilities necessitating higher technology use. Specifically, the necessity for job roles to keep up with technology changes is vividly portrayed through participants' accounts. Participant 8 emphasized the integral role of technology in their job, stating: "my commitment to my job, my job is basically like everything to me. So at the end of the day, I communicate with everything with technology mostly. So, with everything you have to make sure everything is okay." Similarly, Participant 5 reflects on the positive experience of efficiently adopting and utilizing technology following training, noting: "The experience is good because once you get the training on how to use your technology, whatever you get to use, you adopt and you get to use them efficiently and as I say, more faster going things."

Participants also exhibit a conscious adaptation to technology changes overall. Participant 8 articulated a gradual acclimation to technological advancements, stating: "Adapting to it very well because I get used to it day by day, so it's easier… For your clock in you get adapt to that to contact the office and texting, making sure location is all right and those stuff." Furthermore, Participant 7 contrasts past and present technological capabilities, emphasizing the transformative

impact of internet-enabled devices on information access and problem-solving, stating: "back then using the button phones, there wasn't any internet on it. Comparing now with the Android phones, there are internet on it where I can quickly run to Google and ask Google a question if no one is there to ask that question. Or even if they ask them the question and they respond, I can go to Google for more clarity."

Adapting to changing job duties due to technology emerged as a significant finding within participants' narratives. Participant 7 stated that they navigates challenges associated with assisting colleagues in utilizing new technologies, stating: "Well adapting to those shifts is a big challenging in the sense of those persons who are assigned to using those robots, they have to be calling me, Hey send you, this is not working, it's not working. So, I have to be stopping what I am doing to go and assist them." Moreover, Participant 3 contextualizes the shift towards technology in cleaning tasks within the broader framework of health and efficiency, stating: "Like the technology things is I see more like to our health because someone that using a broom, sweeping, sweeping, there will be an effect."

Additionally, the inevitability of adapting to technology change came across throughout the participants' reflections. Participant 7 acknowledges the pervasive influence of technology, stating: "Adapting It is what it is, it's technology and technology is actually taking over. So even if it is by force, I have to adapt to it either way." Additionally, participants recognize greater job responsibilities requiring higher technology use. Participant 8 elucidates the expanded role of technology in supervisory tasks, stating: "My role and experience being in charge, you have to be using your technology more often, like communicate with the supervisor, ordering supplies, making sure staff is on time, staff is on location, so adapting to it is easier and better." Overall, the participants shared insights that illuminated the complex interplay between technological

advancements and adapting to change within the cleaning service industry. Participants' direct quotes provide valuable insights into the multifaceted nature of this theme, underscoring the necessity, conscious adaptation, dynamic job duties, inevitability, and increased responsibilities associated with technological evolution in the realm of cleaning services.

4.4 Theme 4: Job Quality Improvements

The theme of job quality improvements in the cleaning service industry emerged as a pivotal aspect of the participants work lives which was directly influenced by technological advancements. Participants' direct quotes provide rich insights into various dimensions of this theme, including the integration of technology to lessen intense manual labor, enhancements in job task quality, improvements in the health and safety of cleaners, the embrace of robots and their usage, as well as attitudes towards accepting and being excited about new and future technological changes.

Technology's role in reducing intense manual labor and improving job task quality is highlighted by participants. Participant 8 reflected on the potential for technology, such as robots, to alleviate physical strain, stating: "So, with due time we have more technology. So, for workers, work will be a little easier with technology." Similarly, Participant 7 discusses how the use of a vacuum instead of traditional cleaning tools like brooms and dustpans has made their work "much easier and way easier," leading to improvements in efficiency and task completion. Moreover, participants emphasize the positive impact of technology on the health and safety of cleaners. Participant 3 discussed how advancements such as sensor-operated trash receptacles minimize direct contact with waste, stating: "You just pass your hand over a sensor, it open by itself...So technology make cleaners life easier and also for human being." Additionally, Participant 3

highlights the broader health benefits of technological innovations in cleaning tasks, noting: "Yeah, it's safer and cleaner. We don't have much contact with it."

The participants ability to embrace the use of robots as well as their utilization in cleaning tasks signified a significant shift towards job quality improvements. Participant 7 discussed how robots can autonomously perform cleaning tasks, minimizing the need for manual labor and streamlining operations: "Those robots will do the jobs...So I just start it and it'll do exactly the task that it is said to be done." Similarly, participant 6 expressed anticipation for the potential contributions of robots in easing physical demands: "Well the robots, robots, let's say robots...There are stuff that I would do, the robot will be doing them so it'll be so hard for me even areas to bend."

Participants also demonstrated an accepting attitude towards new technology and excitement for future technological changes. Participant 3 reflected on the transformative impact of technology across various aspects of life, stating: "It is a huge impact in all the ways you can see not just in the cleaning industry." Furthermore, Participant 6 expressed optimism about the future of technology, envisioning greater ease and efficiency: "So as time go by, I think technology is getting greater and people are going to do a lot of stuff easier with this new technology coming up." Overall, based on the data, it was evident that the participants collectively felt that technology advancements were critical in reducing manual labor, enhancing task quality, and improving health and safety standards.

4.5 Theme 5: Cautious Optimism

The participants also displayed a nuanced perspective of cautious optimism regarding the integration of technology advancements in the cleaning service industry. Participants' shed light

on their mixed feelings, balancing optimism for improved efficiency with concerns about job security, resistance to change, and uncertainty about the long-term implications of technology. Specifically, some participants expressed fears of being replaced by new technology and a perceived threat to job security. Participant 7 reflected on the potential for technology to streamline tasks but expresses apprehension about the consequent reduction in work hours: "It'll definitely be much easier for persons, but...the technology is making it much easier for them." Similarly, Participant 2 articulates a conflicted viewpoint, recognizing the benefits of technology while acknowledging the potential for job loss: "the robot will take some of your hours so you getting less hours… It will be good and it'll be bad."

Furthermore, participants express conflicting emotions regarding the long-term implications of new technology. Participant 3 illustrated this ambivalence, highlighting both the positive impact on job efficiency and the concern about potential job displacement: "I see it positive because it helps us a lot...But...are we going to be out of it due to so much technology...? So, when I think it that way I think that we're going to be together...like a progress." Participant 1 echoes this sentiment, acknowledging the benefits of technology while expressing skepticism about its overall impact: "So the technology is in one part is good, can make your life a little bit easier but not a hundred percent good."

Some perceived resistance to technology change was also evident among participants. Participant 4 expressed a preference for traditional cleaning methods despite acknowledging the benefits of technology: "In one way it's good, it's very nice. Good, but I prefer my broom and mop." Similarly, Participant 1 discussed resistance to incorporating technology into their workflow, emphasizing the secondary importance of technology in their daily routine: "The phone to me is like a second thing. It's not important...Some people get accepted and get adapt to it. The

phone feed them life. I'm not like that." Overall, participant perceptions revealed complex emotions surrounding the integration of technology in the cleaning service industry, characterized by cautious optimism. Participants expressed a blend of hope for improved efficiency alongside concerns about job security and skepticism about the long-term implications of technological advancements.

5.0 Chapter 5 – Discussion and Implications

The integration of technology in various industries has brought about significant transformations, reshaping the nature of work and the experiences of employees. In the cleaning service industry, where manual labor has traditionally been predominant, the incorporation of technology has led to profound changes in job roles, duties, and overall job satisfaction among employees. This chapter aims to provide a comprehensive discussion of the insights garnered from participant narratives regarding the integration of technology in the cleaning service industry, as presented in the results section of this paper. The results section presented a thematic analysis of participant narratives, focusing on five key themes that emerged from qualitative analysis. These themes encapsulate the diverse experiences and perspectives of participants regarding technology integration, ranging from their personal interactions with technology to the implications for job quality and satisfaction. Participants shared varying degrees of engagement with technology, reflecting on their experiences growing up, in their personal lives, and within the cleaning profession. This variability in perspectives highlighted the dynamic nature of technological adaptation within the industry (Bolli et al., 2018; Caiazza, 2016).

One prominent theme that emerged from the analysis was the association between technology integration and increased job satisfaction among participants. The participants expressed enjoyment and satisfaction in adapting to new technologies, recognizing their positive impact on efficiency, productivity, and overall satisfaction in their roles. Additionally, the integration of technology in cleaning tasks resulted in job quality improvements, including the reduction of manual labor intensity and enhancements in task quality and safety. However, participants also expressed concerns about the challenges associated with technology integration, such as job security, resistance to change, and the need for comprehensive training programs. The

narratives underscored the complex emotions surrounding technological advancements, characterized by a blend of hope for improved efficiency alongside concerns about job security and skepticism about long-term implications (Imran et al., 2023).

Furthermore, the insights derived from participant narratives shed light on additional issues within the cleaning industry, particularly concerning hiring practices, educational gaps, and training programs. Participants highlighted the diverse backgrounds of individuals entering the cleaning profession and emphasized the importance of addressing educational gaps through accessible training programs (Rodriguez-Valencia et al., 2020). Addressing these challenges requires a multifaceted approach, including reforms in the education system, the development of robust training programs, and collaboration between industry stakeholders, educational institutions, and technology companies. Moreover, understanding the nuances of technology integration from the perspective of lower socioeconomic status workers offers profound implications for workforce readiness and organizational adaptability (Al-Farsi & Hassan, 2023).

Overall, the analysis of participant narratives provides valuable insights into the multifaceted experiences and perspectives of cleaners regarding the integration of technology in the cleaning service industry. More specifically, the insights drawn from the participants highlight the diverse backgrounds of individuals entering the cleaning profession, including immigrants and individuals with varying levels of educational attainment and differing training (Chawla et al., 2023). While recognizing the importance of addressing educational gaps, particularly among those without high school degrees, participants emphasized the need for shorter courses and training programs that cater to individuals with limited educational backgrounds (Singh et al., 2022). The development of such programs could help bridge the gap between formal education and the skills

required for employment in the cleaning industry, ultimately promoting greater inclusivity and accessibility (Kalleberg, 2009).

For example, in response to these challenges, the International Sanitary Supply Association (ISSA) has taken proactive steps to offer training programs aimed at raising the competency of cleaning staff (Smith et al., 2018). By focusing on improving the skills of the lowest-performing individuals, ISSA aims to elevate the overall competency of the entire industry and facilitate the implementation of new technologies. However, participants expressed concerns about the effectiveness of existing training programs, particularly in preparing employees to troubleshoot issues related to new technologies. It became clear that the implementation of innovative technologies, such as cleaning robots, has introduced new challenges for cleaning companies, particularly in terms of technical support and troubleshooting (Smith et al., 2018). Participants shared personal experiences of grappling with technical issues and the need to bring in technicians from other countries to address these challenges promptly. This highlights the importance of comprehensive training programs that equip employees with the skills and knowledge needed to effectively utilize and troubleshoot new technologies.

Moving forward, addressing the education and training needs of cleaning workers requires a multifaceted approach (Autor et al., 2020). Firstly, there is a need to reform the education system to provide non-traditional students with accessible learning opportunities at all levels, from primary education to vocational training (Smith et al., 2018; Waschull et al., 2022). Robust trade school programs and ongoing training initiatives within companies can help ensure that employees receive the necessary skills and knowledge to excel in their roles (Rodriguez-Valencia et al., 2020). Additionally, the industry can draw lessons from best practices in other sectors, such as the medical sales process, to develop more effective and accessible training programs for cleaning staff (Al-

Farsi & Hassan, 2023). Ultimately, addressing the disconnect between technological development and workforce training requires collaboration between industry stakeholders, educational institutions, and technology companies (Autor et al., 2020; Smith et al., 2018). By investing in comprehensive training programs, improving access to educational opportunities, and fostering collaboration between industry players, the cleaning industry can overcome current challenges and empower its workforce to thrive in an increasingly technology-driven environment.

Further, understanding the nuances of technology integration within the cleaning industry, particularly from the perspective of lower socioeconomic status (SES) workers with limited formal education and training opportunities, offers profound implications for workforce readiness and organizational adaptability. By examining these insights through the lens of work adjustment theory, we can delve deeper into the challenges faced by these workers and the strategies organizations can employ to facilitate smoother transitions.

Specifically, the variability in participants' understanding and utilization of technology underscores the multifaceted nature of technological integration within the workplace. Work adjustment theory posits that individuals undergo a dynamic process of adaptation when faced with new work environments and technologies (Bayl-Smith & Griffin, 2015). However, for lower SES workers with limited formal education, this process may be hindered by various factors such as inadequate preparation, resource constraints, and lack of support (Groshen & Holzer, 2021). Participants' struggles with troubleshooting and utilizing innovative technologies highlight the importance of accessible and comprehensive training programs. According to work adjustment theory, individuals require adequate resources and support to effectively adapt to new work demands. Shorter, more accessible training programs tailored to the needs of non-traditional learners can facilitate smoother transitions and enhance overall industry competency (Singh et al.,

2022). Moreover, organizations can benefit from implementing strategies that provide ongoing support and skill development to ensure continuous adaptation to technological advancements. Furthermore, the disconnect between technology developers and end-users underscores the need for collaborative efforts to bridge the gap between technological innovation and practical application in the workplace. Work adjustment theory emphasizes the role of organizational support in facilitating successful work transitions. By fostering collaboration between technology developers, industry stakeholders, and educational institutions, organizations can ensure that technological advancements are effectively integrated into work environments while addressing the unique needs and challenges of lower SES workers (Kalleberg, 2009).

The findings also highlight the importance of supportive educational systems that cater to the needs of non-traditional learners (Al-Farsi & Hassan, 2023). Work adjustment theory emphasizes the dynamic interplay between individual characteristics and environmental factors in shaping work adaptation processes. Robust trade school opportunities, vocational training programs, and non-traditional learning methods can better prepare individuals for technological advancements within the workforce, ultimately promoting career growth opportunities and upward mobility. Additionally, addressing the failings in education systems and technology companies can alleviate the burden placed on smaller businesses to navigate technological transitions independently. Work adjustment theory suggests that individuals require a supportive environment to adapt to new work demands successfully. By acknowledging and addressing these failings, organizations can foster a more conducive environment for technological integration and workforce readiness, ultimately leading to improved job satisfaction, performance, and organizational outcomes.

The findings from the data analysis also unveiled a clear and positive relationship between the integration of new technologies in the workplace and increased job satisfaction, alongside improvements in job quality. Through participant narratives, it becomes evident that embracing technological advancements contributes significantly to employees' overall perceptions of their roles, their job satisfaction levels, and the quality of work they produce.

Participants consistently highlighted the benefits of adapting to new technologies, emphasizing how these advancements enhance efficiency, productivity, and overall satisfaction in their respective roles. This echoes existing research demonstrating that technological integration can lead to higher job satisfaction (Chawla et al., 2023). Moreover, participants expressed enjoyment and satisfaction in learning to use new technologies, recognizing the positive impact they have on their work environment.

‹Furthermore, technological advancements have tangible implications for job quality improvements. Participants noted how streamlined processes, increased consistency in work output, and the ability to focus on detailed tasks have enhanced the quality of their work. Despite the presence of robots and machines, participants still perceive the work done as their own, emphasizing the importance of ensuring that technology complements rather than replaces human labor (Brynjolfsson & McAfee, 2017). Additionally, the narratives shed light on the positive impact of technology on reducing labor intensity and improving health and safety. The transition from manual to digital processes has not only reduced physical strain but also minimized the risk of exposure to hazardous compounds, thereby enhancing overall well-being.

These findings hold significant implications for businesses seeking to enhance job satisfaction and job quality through technological integration. Organizations must consider the motivational aspects of implementing new technologies and invest in high-quality technological solutions to

maximize benefits. Additionally, creating a supportive environment for technological innovation through organizational culture and leadership can further amplify these positive impacts.

Expanding upon the insights derived from the participants' narratives, it becomes evident that the cleaning industry faces multifaceted challenges that require innovative solutions and collaborative efforts (Rodriguez-Valencia et al., 2020; Rosic et al., 2024). One key area of concern highlighted by participants is the need for consistency in hiring requirements. With individuals from diverse backgrounds entering the cleaning profession, including immigrants and those with varying levels of educational attainment, there is a growing recognition of the importance of inclusive hiring practices. Addressing this challenge requires a holistic approach that encompasses not only hiring practices but also educational and training initiatives aimed at promoting greater inclusivity and diversity within the workforce. Furthermore, participants emphasized the critical role of education and training programs in bridging the gap between formal education and the skills required for employment in the cleaning industry. While shorter courses and training programs tailored to individuals with limited educational backgrounds are essential, there is also a need for ongoing training initiatives within companies to ensure that employees are equipped with the necessary skills and knowledge to excel in their roles. Collaborative efforts between industry stakeholders, educational institutions, and technology companies are crucial for addressing the disconnect between technological development and workforce training, thereby empowering the cleaning industry to thrive in an increasingly technology-driven environment.

Moreover, understanding the nuances of technology integration within the cleaning industry, particularly from the perspective of lower socioeconomic status (SES) workers, offers profound implications for workforce readiness and organizational adaptability. Participants' struggles with troubleshooting and utilizing innovative technologies highlight the importance of

accessible and comprehensive training programs tailored to the needs of non-traditional learners. (Schultheiss & Backes-Gellner, 2024). By investing in training initiatives that provide ongoing support and skill development, organizations can facilitate smoother transitions and enhance overall industry competency. The disconnect between technology developers and end-users underscores the need for collaborative efforts to bridge the gap between technological innovation and practical application in the workplace. By fostering collaboration between technology developers, industry stakeholders, and educational institutions, organizations can ensure that technological advancements are effectively integrated into work environments while addressing the unique needs and challenges of lower SES workers.

Furthermore, the findings from the data analysis unveiled a clear and positive relationship between the integration of new technologies in the workplace and increased job satisfaction, alongside improvements in job quality. Embracing technological advancements contributes significantly to employees' overall perceptions of their roles, job satisfaction levels, and the quality of work they produce. By acknowledging and addressing the challenges highlighted by participants, organizations can foster a more conducive environment for technological integration and workforce readiness, ultimately leading to improved job satisfaction, performance, and organizational outcomes.

5.1 Theoretical Implications

The study's findings, technology socialization differences, increased job satisfaction, adaptation to changes, job quality improvements, and cautious optimism towards technological advancements within the cleaning service industry, can be comprehensively understood through the lens of Work Adjustment Theory (WAT). As previously expanded upon, WAT provides a robust theoretical framework for analyzing how individuals fit into their work environments and

cope with changes, emphasizing the dynamic interaction between individuals' abilities, needs, and desires, and the demands and rewards of their jobs (Dawis & Lofquist, 1984). Work Adjustment Theory provides a valuable framework for understanding the challenges and dynamics of adapting to new work environments and technologies, particularly for blue-collar workers (Hesketh & Griffin, 2005). Blue-collar workers, often employed in manual labor or skilled trades, face unique challenges when it comes to adjusting to changes in their work environment, including technological advancements.

Given that one aspect of Work Adjustment Theory is the recognition of the dynamic process of adaptation that individuals undergo when faced with new work demands. For blue-collar workers, this adaptation process may be influenced by factors such as the nature of their work tasks, the level of technical expertise required, and the availability of resources and support. In the context of technological integration, blue-collar workers may encounter challenges related to the acquisition of new skills and knowledge required to operate and troubleshoot advanced technologies (Schultheiss & Backes-Gellner, 2024). Unlike white-collar workers who may have greater access to formal education and training opportunities, blue-collar workers often rely on on-the-job training and hands-on experience to develop their skills. Work Adjustment Theory emphasizes the importance of providing adequate resources and support to facilitate successful work transitions. For blue-collar workers, this may involve implementing comprehensive training programs that cater to their specific needs and learning styles. These programs should not only focus on technical skills but also address broader issues such as communication, problem-solving, and adaptability.

First, technology socialization differences among cleaning service industry employees can be interpreted through WAT as variations in individuals' abilities to adapt to and utilize

technological advancements (Bayl-Smith & Griffin, 2015). According to WAT, individuals seek to achieve and maintain a balance between their personal characteristics and the demands of their work environment (Dawis & Lofquist, 1984; Hesketh & Griffin, 2005). Thus, differences in technology socialization may lead to variations in employees' abilities to integrate new technologies into their work routines and adapt to changes in their job tasks, especially for low SES employees. The participants in the current study aligned with this interpretation, given that those employees who maintained higher levels of education also displayed a better understanding of the technological advancements that has been utilized in their work settings.

Increased job satisfaction resulting from technological advancements aligns with WAT's emphasis on the congruence between individual characteristics and job requirements (Bayl-Smith & Griffin, 2015). WAT posits that successful job performance and satisfaction occur when there is a fit between an individual's abilities, needs, and desires, and the demands and rewards of their job (Dawis & Lofquist, 1984; Hesketh & Griffin, 2005). Therefore, the positive impact of technology on job satisfaction in the cleaning service industry can be attributed to improvements in the alignment between employees' abilities and job tasks facilitated by technological advancements.

Adaptation to changes, particularly technological changes, is a central tenet of WAT (Bayl-Smith & Griffin, 2015). The theory highlights the dynamic nature of the employee-job fit, emphasizing the importance of ongoing adjustments to maintain alignment between individual characteristics and job requirements (Dawis & Lofquist, 1984). Participants' experiences in the study, reflecting varying degrees of adaptation to technological changes, underscore the importance of considering individuals' abilities and needs when implementing technological innovations in the workplace.

Job quality improvements resulting from technological advancements can be understood through WAT's focus on the interaction between individuals and their work environments. According to the theory, job satisfaction and performance are influenced by the congruence between an individual's abilities, needs, and desires, and the demands and rewards of their job (Dawis & Lofquist, 1984; Harper & Shoffner, 2004; Hesketh & Griffin, 2005). Therefore, the positive impact of technology on job quality in the cleaning service industry can be attributed to improvements in the alignment between employees' abilities and job tasks facilitated by technological advancements.

Cautious optimism towards technological advancements reflects employees' concerns about potential job displacement and the need for continuous learning and adaptation, which align with WAT's emphasis on the dynamic interaction between individuals and their work environments (Bayl-Smith & Griffin, 2015). The theory posits that individuals engage in a continuous process of seeking and maintaining a balance between their personal characteristics and the demands of their work environment (Dawis & Lofquist, 1984). Therefore, organizations must consider employees' abilities and needs when implementing technological innovations to ensure successful adaptation and minimize potential negative consequences. Overall, the study's findings regarding technology socialization differences, increased job satisfaction, adaptation to changes, job quality improvements, and cautious optimism towards technological advancements in the cleaning service industry can be effectively analyzed through the theoretical framework of Work Adjustment Theory. By considering the dynamic interaction between individuals' abilities, needs, and desires, and the demands and rewards of their jobs, organizations can enhance employees' adaptation to technological changes and promote job satisfaction and performance in the workplace.

5.2. Limitations and Future Research

The rapid advancement of technology in today's society has revolutionized the way businesses operate, presenting both opportunities and challenges. However, amidst this rapid change, certain limitations persist in the adoption and integration of technology within the workforce. One such limitation is the tendency of technology firms to overlook the perspectives and needs of the actual users – the workers and employees who interact with these technologies on a daily basis. Understanding user experiences and requirements is essential for ensuring the successful implementation and utilization of new technologies in the workplace. Moreover, as technology continues to evolve at an unprecedented pace, users often find themselves struggling to keep up. Once they grasp a particular technology, newer and more advanced versions emerge, rendering their current equipment outdated. This perpetual cycle of technological obsolescence underscores the importance of continuous learning and adaptation in today's digital landscape. Future research should focus on developing strategies for effective knowledge transfer and continuous skill development to help users stay abreast of evolving technologies.

Identifying best practices in technology implementation across various sectors is another area ripe for exploration. By analyzing successful cases in the tech space, researchers can glean valuable insights into the strategies and approaches that have yielded positive outcomes. From deep learning algorithms for scheduling to gamification of the workplace, understanding and disseminating best practices can guide organizations in their efforts to leverage technology effectively. The implications of artificial intelligence (AI) technologies on workforce management are vast and multifaceted. Deep learning algorithms for scheduling and rescheduling tasks, for example, have significant implications for workforce optimization and productivity. Moreover, the gamification of the workplace, wherein employees are incentivized through point systems for

completing tasks, has emerged as a promising strategy for enhancing employee engagement and performance. Future research should delve deeper into the impact of AI technologies on job roles, responsibilities, and overall job satisfaction.

Understanding stakeholder perceptions is paramount for successful technology implementation. This includes gathering insights from business owners, directors of operations, quality control personnel, and other key stakeholders. By understanding their perspectives, researchers can identify barriers, concerns, and opportunities related to technology adoption in the workplace, thereby informing more effective implementation strategies. Furthermore, in the post-COVID era, client sensitivity to cleanliness and hygiene has heightened, leading to increased demand for cleaning services. Future research should assess client attitudes towards the use of new technologies in maintaining cleanliness standards and examine their willingness to allocate more resources towards cleaning budgets post-pandemic. This research will provide valuable insights into market dynamics and industry growth potential.

Examining the long-term effects of technological integration on job satisfaction and job quality is essential, particularly for lower socioeconomic status (SES) workers in industries like cleaning (Groshen & Holzer, 2021). By understanding the impact of technology on job roles, career progression, and overall job satisfaction, researchers can address potential challenges and ensure equitable outcomes. Additionally, exploring the role of organizational culture and leadership in fostering a supportive environment for technological innovation is crucial for maximizing the benefits of technology in the workplace. Overall, the process of addressing these limitations and exploring future research avenues will contribute to a more comprehensive understanding of the impact of technological advancements on workforce dynamics, organizational practices, and market dynamics across various industries. Through empirical

investigations and stakeholder engagements, researchers can inform evidence-based strategies for maximizing the benefits of technology while mitigating potential challenges and disparities.

5.3 Conclusion

The integration of technology in various industries, including the cleaning service sector, has led to significant transformations in the nature of work and the experiences of employees. This study aimed to explore the lived experiences of janitors and cleaning service employees in adapting to technological shifts within the cleaning industry, highlighting the challenges, coping mechanisms, and implications of technology use from their perspective. Through in-depth interviews and qualitative analysis, the study uncovered several key themes regarding participants' experiences and perspectives on technology integration in the cleaning service industry. Participants shared diverse perspectives on their interactions with technology, reflecting on their experiences growing up, in their personal lives, and within the cleaning profession. While some embraced technological advancements, others expressed concerns about job security and the effectiveness of existing training programs in preparing employees to navigate new technologies.

The findings underscored the positive relationship between technology integration and increased job satisfaction, alongside improvements in job quality. Participants highlighted how technological advancements enhance efficiency, productivity, and overall satisfaction in their roles, while also reducing physical strain and improving health and safety. However, participants also expressed concerns about job security, resistance to change, and uncertainty about the long-term implications of technology. Theoretical implications of the study were discussed within the framework of Work Adjustment Theory (WAT), emphasizing the dynamic process of adaptation to new work environments and technologies among blue-collar workers. WAT provided a valuable lens for understanding the challenges faced by lower socioeconomic status (SES) workers in

adapting to changes in their job environments, emphasizing the pivotal role of socioeconomic factors in influencing the person-environment fit.

The study also identified limitations and proposed avenues for future research, including strategies for effective knowledge transfer, understanding stakeholder perceptions, and examining long-term effects of technological integration on workforce dynamics and organizational practices. By addressing these gaps in the literature, this study contributes to filling the existing gap in the literature by providing a comprehensive examination of the intersectionality of technology use and socioeconomic factors among cleaning workers. Moreover, the study highlighted the need for targeted interventions and support mechanisms to facilitate successful adaptation and work adjustment in dynamic work environments. This includes the development of shorter courses tailored to individuals with limited educational backgrounds, as well as ongoing training initiatives within companies to ensure that employees are equipped with the necessary skills and knowledge to excel in their roles.

In conclusion, this study provides valuable insights into the experiences and perspectives of cleaning workers regarding the integration of technology in the cleaning service industry. By understanding the challenges and opportunities associated with technological advancements, organizations can develop strategies to enhance job satisfaction, job quality, and overall well-being of cleaning workers amidst technological shifts in the industry. Through collaborative efforts between industry stakeholders, educational institutions, and technology companies, the cleaning industry can overcome current challenges and empower its workforce to thrive in an increasingly technology-driven environment.

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Appendix A

Initial Code Sheet

Inconsistency with defining technology
Initially naive about technology
Lack of understanding of technology
Lack of access to technology at younger ages
Unclear about what 'counted' as new technology
Did not consistently acknowledge mobile phone use as technology
Had to be reminded what 'counted' as new technology
Socialization factors can influence acceptance of new technology
Additional "education" needed regarding new technology
High level of technology use at early age
Lack of formal education
Formal education not an indicator of acceptance
Accepting of new technology
Excited by new technology
Constantly adapting to new technology
Embraced making job more efficient/easier
Excited by future technology change
Robot use embraced
Robot use caution
Fear of being replaced by new technology
No choice but to adapt to technology change
Technology meant less intense work
Less intense manual labor
Higher quality of work
Leadership responsibilities improved by technology
Enjoying adapting to new technology
Adjusting to a learning curve
Not all technology changes are major (vacuum v. broom)
Excited about the learning opportunities
Scale of technology advancement is threatening
Acknowledgement that technology is constantly evolving
Job changes due to technology
Greater job responsibilities require higher technology use
Higher job satisfaction
Necessity for job to keep up with technology changes
Expanded job duties due to technology (did not fully embrace that they are technicians in a way
– just that they 'can' use these robots but failed to see that they are training and helping others
with them as well)
Adapting to changing job duties
Resistance to technology change