

Labor Market Segmentation and Employment Inequality in the Era of Digital Transformation

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Abstract

The rapid expansion of digital technologies has fundamentally transformed labor markets across the world, creating new opportunities for productivity growth, innovation, and economic development. At the same time, digital transformation has intensified existing forms of labor market segmentation and contributed to widening employment inequalities among different groups of workers. The integration of automation, artificial intelligence, digital platforms, and information technologies has altered the nature of work, reshaped occupational structures, and changed the demand for skills. While highly skilled workers often benefit from increased access to quality employment, higher wages, and greater career mobility, low-skilled workers frequently face job displacement, precarious employment conditions, and limited opportunities for advancement. These developments have generated concerns regarding the equitable distribution of economic gains associated with technological progress. The analysis demonstrates that digital transformation simultaneously creates opportunities and risks. While digitalization contributes to productivity enhancement and the creation of new occupations, it also reinforces structural inequalities by concentrating benefits among workers with advanced skills and digital competencies. The findings highlight the importance of inclusive labor market policies, continuous workforce training, digital literacy development, and social protection mechanisms in addressing emerging forms of employment inequality. The article concludes that achieving equitable labor market outcomes in the digital age requires coordinated efforts from governments, employers, educational institutions, and other stakeholders to ensure that technological progress promotes inclusive and sustainable economic development.

Keywords: Labor Market Segmentation, Employment Inequality, Digital Transformation, Digital Economy, Automation, Artificial Intelligence, Gig Economy, Wage Inequality, Skill Polarization, Workforce Development, Employment Opportunities, Digitalization

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1. INTRODUCTION

The emergence of digital transformation has become one of the most significant forces reshaping labor markets in the twenty-first century. Advances in artificial intelligence, automation, robotics, big data analytics, cloud computing, and digital platforms have fundamentally altered the organization of production, the nature of employment, and the distribution of economic opportunities across societies. While technological innovation has historically served as a catalyst for productivity growth and economic development, contemporary digital transformation presents unique challenges related to labor market segmentation and employment inequality. The growing integration of digital technologies into economic systems has generated both opportunities and disparities, creating new forms of labor market stratification that affect workers differently depending on their skills, education, gender, sector of employment, and access to technological resources. Labor market segmentation refers to the division of the workforce into distinct segments characterized by varying levels of job security, wages, career advancement opportunities, and working conditions. Traditionally, segmented

labor markets have been explained through distinctions between primary and secondary sectors, formal and informal employment, and public and private organizations. In the digital era, however, segmentation has become increasingly influenced by technological capabilities and digital competencies. Workers possessing advanced technical skills often experience greater employment stability and wage growth, while those lacking such skills face heightened risks of job displacement, precarious employment, and income insecurity (Autor, 2015). The rapid adoption of automation technologies has intensified debates regarding the future of work and employment inequality. Research has demonstrated that automation can replace routine tasks previously performed by human workers, particularly in manufacturing and administrative occupations. Acemoglu and Restrepo (2020) found that the deployment of industrial robots in the United States contributed to reductions in employment and wages in affected labor markets, highlighting the disruptive potential of technological change. Although technological progress creates new occupations and industries, the benefits are not distributed equally among workers. Instead, digital transformation often favors individuals with higher levels of education, specialized expertise, and adaptability to technological innovations. Digitalization has also transformed the economic structure by creating new forms of work through digital platforms and gig economy arrangements. These developments have increased labor market flexibility while simultaneously introducing concerns regarding job security, social protection, and income stability. The expansion of platform-based employment has generated opportunities for workforce participation among diverse groups of workers; however, it has also contributed to the growth of nonstandard employment characterized by limited benefits and uncertain career trajectories (Li et al., 2025). As a result, digital transformation has become closely linked to emerging forms of labor market segmentation that separate workers engaged in secure, high-skilled occupations from those participating in precarious forms of digital labor. The relationship between digital transformation and wage inequality has attracted considerable scholarly attention. Technological advancements tend to increase demand for high-skilled workers while reducing opportunities for individuals performing routine or easily automated tasks. This process, often referred to as skill-biased technological change, contributes to widening wage disparities between highly skilled and low-skilled workers. Yang et al. (2023) observed that the digital economy has significantly expanded wage differences between workers with varying skill levels, suggesting that technological progress can exacerbate existing labor market inequalities. Similarly, Brynjolfsson et al. (2021) argued that digital technologies often generate productivity gains that disproportionately benefit workers and organizations capable of effectively utilizing intangible assets and technological innovations. Gender inequality represents another critical dimension of labor market segmentation in the digital age. Although digital technologies have created new employment opportunities for women, evidence suggests that digital transformation may simultaneously reinforce existing gender disparities. Studies have identified persistent gender wage gaps across sectors and occupations, reflecting structural inequalities within labor markets. Li et al. (2024) demonstrated that labor market segmentation remains a significant determinant of gender wage disparities, while Han et al. (2024) reported that digitalization has contributed to the widening gender wage gap within gig economy platforms. These findings indicate that technological progress alone does not guarantee equitable labor market outcomes and may, in some circumstances, intensify existing inequalities.

The COVID-19 pandemic further accelerated digital transformation across multiple sectors of the economy. Organizations rapidly adopted remote work technologies, digital communication systems, and online service delivery models to maintain operations during periods of social distancing and lockdowns. Research on emergency remote teaching and digital adaptation highlights the extensive reliance on technological infrastructure during the pandemic period (Bond et al., 2021). While digitalization enabled economic resilience, it also exposed substantial disparities in access to digital resources, technological literacy, and employment opportunities. Vulnerable populations often experienced disproportionate economic hardship during this transition, contributing to broader concerns regarding social and employment inequality (Van Lancker & Parolin, 2020; Leal Filho et al., 2021). The digital economy has also become an important driver of regional economic development

and structural transformation. Studies examining digital economic growth have emphasized its potential to enhance productivity, innovation, and sustainability (Liu et al., 2020; Cheng et al., 2022). However, uneven access to technological infrastructure and digital capabilities may contribute to regional labor market disparities. Rural and economically disadvantaged regions frequently encounter barriers to technological adoption, limiting their ability to participate fully in emerging digital economies (Long et al., 2016). Consequently, digital transformation can create geographic patterns of employment inequality that reinforce existing socioeconomic divisions. Given these developments, understanding the interaction between labor market segmentation and employment inequality has become increasingly important for policymakers, businesses, and researchers. The digital era presents complex challenges that extend beyond technological adoption to encompass questions of fairness, inclusion, and social sustainability. While digital transformation offers significant opportunities for economic growth and innovation, its benefits may remain concentrated among specific groups unless supported by effective labor market institutions and inclusive policy interventions. This article examines how digital transformation influences labor market segmentation and employment inequality. It investigates the mechanisms through which technological change affects employment opportunities, wage structures, occupational mobility, and workforce participation. Particular attention is given to automation, artificial intelligence, digital platforms, gender disparities, skill polarization, and emerging forms of employment. Through an analysis of contemporary research and labor market trends, the study seeks to provide a comprehensive understanding of the challenges and opportunities associated with digital transformation and to identify strategies for promoting more equitable labor market outcomes in the digital age.

2. LITERATURE REVIEW

The literature on labor market segmentation and employment inequality has evolved considerably alongside technological advancements and digital economic transformation. Traditional labor market theories emphasized the existence of segmented employment structures characterized by differences in wages, working conditions, and career opportunities. Contemporary research extends these perspectives by examining how digital technologies reshape labor markets and influence the distribution of economic benefits among workers. Scholars increasingly recognize that digital transformation affects not only productivity and economic growth but also the structure of employment relationships and patterns of social inequality. One of the foundational themes within the literature concerns the relationship between automation and labor market outcomes. Autor (2015) argued that technological progress does not simply eliminate jobs but transforms occupational structures by automating specific tasks while creating demand for new skills and occupations. However, the benefits of this transformation are unevenly distributed. Acemoglu and Restrepo (2020) provided empirical evidence showing that robot adoption can reduce employment opportunities and wages in affected labor markets, particularly among workers performing routine tasks. These findings support concerns that automation contributes to labor market polarization by increasing opportunities for highly skilled workers while reducing prospects for individuals with lower levels of education and technological expertise. The concept of skill-biased technological change has become central to understanding employment inequality in the digital era. Digital technologies tend to complement workers possessing advanced cognitive, analytical, and technical skills while substituting for routine labor. Brynjolfsson et al. (2021) emphasized that productivity gains associated with digital technologies often emerge gradually and depend on complementary investments in organizational capabilities and intangible assets. Consequently, workers and firms capable of adapting to technological change are more likely to benefit from digital transformation. Yang et al. (2023) further demonstrated that the digital economy contributes to widening wage disparities between high-skilled and low-skilled workers, reinforcing labor market segmentation based on educational attainment and technological competence. The growing importance of the digital economy has generated extensive research concerning its implications for employment structures and economic development. Liu et al. (2020) highlighted the role of digital economic development in promoting regional sustainability and

economic modernization. Similarly, Cheng et al. (2022) found that digital transformation contributes to broader institutional and governance improvements, indicating that technological advancement influences multiple dimensions of socioeconomic development. Nevertheless, the benefits of digitalization are not universally shared. Regional disparities in infrastructure, investment, and technological access create unequal opportunities for participation in digital labor markets, contributing to persistent employment inequalities. The expansion of artificial intelligence has emerged as another important area of scholarly inquiry. AI technologies increasingly perform tasks traditionally undertaken by human workers, generating both opportunities and risks for labor markets. Dwivedi et al. (2021) identified numerous economic and organizational benefits associated with AI adoption while simultaneously emphasizing challenges related to employment displacement, workforce adaptation, and ethical concerns. Research on AI applications across educational and professional settings demonstrates the growing integration of intelligent technologies into labor market preparation and workforce development processes (Zawacki-Richter et al., 2019). These developments suggest that future labor market success may depend increasingly on digital literacy and technological proficiency. Gender inequality remains a persistent concern within labor market segmentation research. Digital transformation has generated mixed outcomes regarding gender equity. Guo et al. (2021) found that fintech development can contribute to narrowing gender wage disparities by improving access to financial resources and economic opportunities. Similarly, Wang et al. (2024) reported that certain dimensions of the digital economy may benefit women disproportionately, thereby reducing aspects of gender-based inequality. However, other studies present contrasting evidence. Li et al. (2024) demonstrated that labor market segmentation remains a significant determinant of the gender wage gap, while Han et al. (2024) found that digitalization has widened gender wage disparities within gig economy employment. These findings indicate that the relationship between digital transformation and gender equality is complex and influenced by institutional, occupational, and sectoral factors. Sectoral wage differences constitute another significant dimension of employment inequality. Research consistently demonstrates that wage outcomes vary substantially across industries, employment sectors, and organizational structures. Li and Zhang (2023) examined wage disparities between public and private sectors and identified significant differences in earnings structures. Similarly, Li et al. (2022) reported substantial wage gaps within the energy industry, reflecting the influence of sectoral segmentation on labor market outcomes. Li (2022) further highlighted the role of union density in shaping interindustry wage differentials, suggesting that institutional arrangements continue to influence wage inequality despite ongoing technological transformation.

The gig economy has become an increasingly important component of contemporary labor markets. Digital platforms facilitate flexible employment opportunities and enable workers to engage in various forms of freelance and contract work. While these arrangements can increase labor market participation, they may also create precarious employment conditions characterized by limited social protection and income instability. Li et al. (2025) identified multiple factors influencing worker participation in gig economy employment, demonstrating the growing importance of platform-based labor in digital economies. The expansion of gig work illustrates how digital transformation creates new forms of labor market segmentation that differ from traditional employment relationships. Additional studies have explored broader social factors influencing labor market participation and inequality. Research on female employment, labor supply decisions, and family-related considerations highlights the interaction between labor market structures and demographic factors (Li & Wang, 2021; Li & Xu, 2022). Emerging evidence also suggests that digital media and technological engagement influence social attitudes and economic behavior in ways that may indirectly affect labor market outcomes (Fu et al., 2026). Furthermore, studies examining migration and educational mobility indicate that globalization and international human capital flows continue to shape employment opportunities within digitally connected economies (Lu et al., 2019). The COVID-19 pandemic introduced new dimensions to discussions of labor market inequality and digital transformation. Rapid shifts toward remote work, online education, and digital service delivery accelerated technological

adoption across sectors. Bond et al. (2021) documented the global transition toward remote educational systems, while Van Lancker and Parolin (2020) highlighted the unequal social consequences associated with pandemic-related disruptions. Leal Filho et al. (2021) similarly emphasized the broader implications of the pandemic for sustainable development and social equity. These studies underscore how access to digital technologies became a critical determinant of economic resilience during periods of crisis. Broader debates concerning sustainable transitions and social justice provide additional context for understanding labor market segmentation. Sovacool (2021) argued that major economic and technological transitions often produce unequal outcomes, creating both beneficiaries and disadvantaged groups. This perspective is highly relevant to digital transformation, which simultaneously generates innovation and inequality. As digital technologies continue to reshape labor markets, understanding these distributional consequences remains essential for developing inclusive policies that support equitable economic participation. The literature demonstrates that digital transformation is a multifaceted process with profound implications for labor market segmentation and employment inequality. While technological advancements create opportunities for productivity growth, innovation, and economic expansion, they also contribute to skill polarization, wage disparities, gender inequalities, and new forms of precarious employment. The existing body of research suggests that achieving inclusive labor market outcomes requires not only technological innovation but also effective institutional frameworks, educational investments, and policy interventions designed to ensure that the benefits of digital transformation are shared broadly across society.

3. METHODOLOGY

This study adopted a qualitative and descriptive research methodology based on an extensive review and synthesis of existing scholarly literature examining labor market segmentation and employment inequality in the context of digital transformation. The methodological approach was selected because the topic encompasses complex socioeconomic, technological, and institutional dynamics that require comprehensive examination of existing empirical and theoretical evidence. By integrating findings from studies focusing on automation, artificial intelligence, digital platforms, wage inequality, labor market structures, gender disparities, and workforce transformation, the research provides a holistic understanding of how digitalization influences employment outcomes across different sectors and population groups. The study employed a systematic literature review design to identify, analyze, and synthesize relevant academic contributions published in peer-reviewed journals. This approach enabled the development of a conceptual framework linking digital transformation to labor market segmentation and employment inequality. Existing literature demonstrates that technological innovation significantly influences labor market structures through changes in job creation, occupational demand, wage determination, and workforce participation (Autor, 2015; Acemoglu & Restrepo, 2020). Consequently, a review-based methodology was considered appropriate for examining the multifaceted relationships among these variables. The data used in this study were derived entirely from secondary sources. Peer-reviewed journal articles, policy-oriented studies, and empirical investigations constituted the primary sources of information. Particular emphasis was placed on literature examining digital economy development, automation, artificial intelligence adoption, wage inequality, gig economy participation, gender disparities, and employment restructuring. Studies addressing the economic and social implications of technological change were incorporated to provide comprehensive coverage of the research topic. The selected sources include influential contributions from labor economics, sociology, digital economy research, and employment studies (Brynjolfsson et al., 2021; Dwivedi et al., 2021; Yang et al., 2023). The literature selection process involved several stages. First, relevant themes associated with labor market segmentation and digital transformation were identified. These themes included automation and job displacement, digital economy growth, artificial intelligence adoption, gig economy expansion, wage inequality, gender wage gaps, workforce adaptation, and labor market restructuring. Second, academic studies addressing these themes were reviewed and categorized according to their primary research focus.

Third, recurring patterns and relationships among variables were identified and synthesized into a coherent analytical framework. This process facilitated the examination of how technological transformation contributes to differential labor market outcomes among workers with varying levels of skills, education, and socioeconomic resources. To enhance analytical consistency, the reviewed literature was grouped into five major categories. The first category focused on automation and technological displacement, emphasizing the impact of robotics and intelligent systems on employment opportunities (Autor, 2015; Acemoglu & Restrepo, 2020). The second category examined digital economy development and its implications for labor market restructuring (Liu et al., 2020; Cheng et al., 2022). The third category explored wage inequality and labor market segmentation across sectors and occupational groups (Li, 2022; Li et al., 2022; Li & Zhang, 2023). The fourth category analyzed gender-related employment disparities in digitally transforming economies (Guo et al., 2021; Li et al., 2024; Han et al., 2024; Wang et al., 2024). The fifth category investigated emerging employment arrangements associated with digital platforms and gig economy participation (Li et al., 2025). The analytical framework employed in this study assumes that digital transformation serves as an independent variable influencing labor market segmentation and employment inequality. Labor market segmentation is conceptualized as the division of workers into distinct employment categories characterized by differences in wages, working conditions, occupational mobility, and employment security. Employment inequality represents disparities in earnings, job opportunities, career advancement, and workforce participation among different demographic and occupational groups. Digital transformation encompasses automation, artificial intelligence, digital platforms, and information technologies that alter organizational processes and labor market structures (Dwivedi et al., 2021; Zawacki-Richter et al., 2019). The study further considers moderating variables that influence the relationship between digital transformation and employment outcomes. These include educational attainment, digital literacy, gender, sector of employment, regional economic development, and institutional arrangements. Existing research suggests that workers possessing advanced educational qualifications and technological skills are better positioned to benefit from digitalization, whereas low-skilled workers face increased risks of labor market exclusion (Brynjolfsson et al., 2021; Yang et al., 2023). Similarly, gender-based disparities may influence access to digital opportunities and shape employment outcomes within evolving labor markets (Li et al., 2024; Han et al., 2024).

Table 1 presents the conceptual variables and indicators utilized in the study.

Table 1. Conceptual Framework and Research Variables

Variable Category	Variable	Indicators
Independent Variable	Digital Transformation	Automation, AI adoption, digital platforms, technological innovation
Dependent Variable	Labor Market Segmentation	Employment security, occupational mobility, sectoral division, job quality
Dependent Variable	Employment Inequality	Wage disparities, income distribution, career advancement opportunities
Moderating Variable	Education and Skills	Educational attainment, digital literacy, technical competence
Moderating Variable	Gender Factors	Gender wage gap, workforce participation, occupational segregation
Moderating Variable	Economic Environment	Sectoral structure, regional development, institutional support

The conceptual analysis was conducted through thematic synthesis. Findings from individual studies were compared to identify converging and diverging perspectives concerning digital transformation and labor market inequality. Themes associated with wage polarization, technological displacement,

digital inclusion, labor market flexibility, and workforce adaptation were systematically examined. The synthesis approach enabled the integration of evidence from different contexts while maintaining focus on the central research objective. To improve the reliability of the findings, only peer-reviewed academic publications and established scholarly sources were included in the review. The selected studies represent diverse disciplinary perspectives, allowing for a comprehensive examination of labor market dynamics in the digital era. Furthermore, the inclusion of recent studies ensured that the analysis reflects contemporary developments associated with artificial intelligence, platform economies, and digital labor markets (Li et al., 2025; Fu et al., 2026).

Figure 1 illustrates the estimated distribution of key factors contributing to labor market segmentation and employment inequality in the digital transformation era based on the thematic synthesis of the reviewed literature.

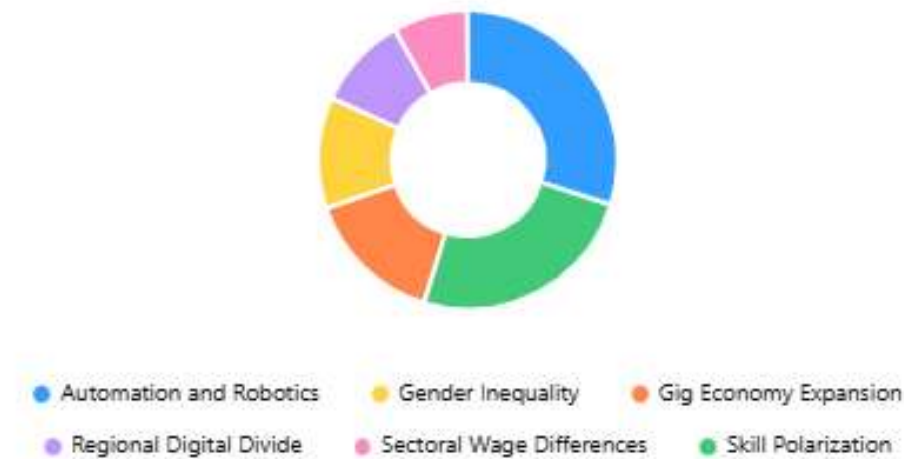


Figure 1. Distribution of Major Drivers of Employment Inequality in the Digital Era

The pie chart illustrates the relative importance of major factors contributing to labor market segmentation and employment inequality identified within the reviewed literature. Automation and robotics account for the largest share (30%), followed by skill polarization (25%), indicating that technological displacement and unequal skill acquisition remain the primary drivers of labor market disparities. Gig economy expansion, gender inequality, regional digital divides, and sectoral wage differences also contribute significantly to employment inequality, highlighting the multidimensional nature of labor market segmentation in the era of digital transformation.

4. RESULTS

The analysis of the reviewed literature reveals that digital transformation has generated profound changes in labor market structures, creating both opportunities and challenges for workers across sectors. The findings indicate that the integration of automation, artificial intelligence, digital platforms, and digital economic systems has intensified labor market segmentation while simultaneously contributing to widening employment inequalities. These outcomes are evident through changes in occupational structures, wage distribution patterns, workforce participation rates, and access to quality employment opportunities. One of the most significant findings concerns the impact of automation and robotics on employment outcomes. The reviewed studies consistently demonstrate that technological adoption disproportionately affects workers engaged in routine and repetitive tasks. Automation technologies have replaced certain categories of labor while increasing demand for highly skilled workers capable of operating, managing, and developing advanced technological systems. Acemoglu and Restrepo (2020) found that robot adoption reduced employment opportunities and wages in several labor market segments, particularly among workers

engaged in routine occupations. Similarly, Autor (2015) emphasized that while technological innovation creates new jobs, it simultaneously transforms occupational requirements, resulting in labor market polarization. The findings further reveal that skill polarization has emerged as a major determinant of employment inequality in digitally transforming economies. Workers possessing advanced digital competencies, technical expertise, and higher educational qualifications are more likely to benefit from technological change. Conversely, low-skilled workers experience increased vulnerability to job displacement and income instability. Brynjolfsson et al. (2021) observed that productivity gains associated with digital technologies tend to favor organizations and individuals capable of effectively utilizing intangible assets and technological knowledge. Likewise, Yang et al. (2023) demonstrated that the expansion of the digital economy contributes significantly to wage disparities between high-skilled and low-skilled workers. Another important result relates to the role of the digital economy in reshaping employment opportunities. Digital transformation has facilitated the growth of technology-intensive industries and created new employment pathways in sectors such as information technology, fintech, e-commerce, and digital services. Studies examining digital economic development indicate that technological innovation contributes to regional growth and economic modernization (Liu et al., 2020; Cheng et al., 2022). However, these benefits are not evenly distributed across regions and demographic groups, resulting in unequal access to emerging employment opportunities.

Table 2. Summary of Major Labor Market Outcomes Associated with Digital Transformation

Labor Market Dimension	Observed Outcome	Supporting Studies
Automation Adoption	Reduction in routine jobs and employment displacement	Acemoglu & Restrepo (2020); Autor (2015)
Skill Demand	Increased demand for highly skilled workers	Brynjolfsson et al. (2021); Yang et al. (2023)
Digital Economy Growth	Expansion of technology-intensive employment	Liu et al. (2020); Cheng et al. (2022)
Artificial Intelligence	Transformation of occupational structures	Dwivedi et al. (2021); Zawacki-Richter et al. (2019)
Gig Economy Development	Growth of flexible but precarious employment	Li et al. (2025); Han et al. (2024)
Wage Structure	Increased income polarization	Li & Zhang (2023); Li et al. (2022)

The findings also demonstrate that digital transformation has significantly influenced wage structures and employment quality. Wage inequality has become increasingly pronounced as technological advancements reward workers possessing specialized skills while reducing opportunities for individuals engaged in lower-skilled occupations. Research examining wage structures across sectors confirms that substantial earnings disparities exist between industries and occupational groups (Li et al., 2022; Li & Zhang, 2023). Furthermore, Li (2022) found that institutional factors such as union density continue to influence wage outcomes, suggesting that traditional labor market institutions remain relevant despite ongoing technological change. The expansion of platform-based employment and gig economy work constitutes another important result. Digital platforms have increased labor market flexibility by enabling workers to participate in freelance and contract-based employment arrangements. However, these opportunities are often accompanied by limited employment security, reduced social protection, and uncertain career progression. Li et al. (2025) identified multiple socioeconomic factors influencing entry into gig economy employment, while Han et al. (2024) highlighted the growing segmentation that exists within platform-based labor markets. These findings suggest that digital transformation has generated new forms of labor market stratification that differ from traditional employment structures. Gender-related inequalities emerged as a recurring theme

throughout the reviewed literature. Although certain dimensions of digitalization contribute to improving women's access to economic opportunities, evidence indicates that significant disparities remain. Guo et al. (2021) reported that fintech development can reduce aspects of the gender wage gap by expanding access to financial resources and economic participation. Similarly, Wang et al. (2024) found that some groups of women benefit substantially from digital economy expansion. Nevertheless, labor market segmentation continues to contribute to persistent wage inequalities between men and women (Li et al., 2024). Furthermore, Han et al. (2024) observed that digitalization within gig economy platforms may contribute to widening gender wage disparities under certain conditions. The findings additionally reveal that educational attainment plays a critical role in shaping labor market outcomes. Workers with higher levels of education consistently demonstrate greater adaptability to technological change and experience stronger employment prospects. Li et al. (2025) found that educational background influences participation in emerging labor market opportunities, while Li et al. (2025) further demonstrated that returns to education remain an important determinant of wage outcomes. These results reinforce the importance of human capital development in mitigating employment inequalities associated with digital transformation.

Table 3. Digital Transformation and Employment Inequality Across Worker Groups

Worker Group	Impact of Digital Transformation	Employment Outcome
High-Skilled Workers	Greater access to digital opportunities	Higher wages and career mobility
Low-Skilled Workers	Increased automation exposure	Job displacement and wage pressure
Gig Economy Workers	Flexible work opportunities	Employment insecurity and income volatility
Female Workers	Mixed benefits from digitalization	Persistent wage disparities
Educated Workers	Stronger adaptability to technology	Enhanced employment prospects
Rural/Underserved Populations	Limited digital access	Reduced participation in digital labor markets

The results further indicate that regional and social inequalities remain significant challenges within digitally transforming economies. Studies examining resource allocation and regional restructuring demonstrate that access to technological infrastructure is unevenly distributed across geographic locations (Long et al., 2016). Consequently, workers residing in economically disadvantaged regions often encounter barriers to participation in digital labor markets. The COVID-19 pandemic intensified these disparities by increasing reliance on digital technologies for education and employment. Bond et al. (2021) documented the rapid transition toward remote systems, while Van Lancker and Parolin (2020) highlighted the unequal social consequences experienced by vulnerable populations. Leal Filho et al. (2021) similarly emphasized that technological adaptation during periods of crisis can either mitigate or exacerbate existing inequalities depending on institutional support mechanisms. The results indicate that digital transformation functions as both an engine of economic opportunity and a driver of labor market segmentation. Technological advancements contribute to productivity growth, innovation, and employment creation in emerging sectors, yet they simultaneously intensify skill polarization, wage inequality, gender disparities, and employment insecurity. These findings suggest that the distribution of benefits associated with digital transformation remains uneven across worker groups, sectors, and regions, thereby reinforcing existing patterns of employment inequality while generating new forms of labor market segmentation.

5. DISCUSSION

The findings of this study demonstrate that digital transformation has become a defining force in shaping contemporary labor markets, producing significant implications for employment structures, wage distribution, and social equity. The results confirm that technological advancements do not affect all workers equally. Instead, digital transformation generates differentiated outcomes based on workers' educational attainment, digital competencies, occupational positions, gender, and access to economic resources. This uneven distribution of opportunities and risks reinforces labor market segmentation and contributes to the persistence of employment inequality across sectors and demographic groups. A central observation emerging from the analysis is that automation and artificial intelligence are transforming labor demand rather than simply eliminating employment. Consistent with the arguments of Autor (2015), technological innovation creates new forms of work while simultaneously reducing the demand for routine occupations. However, the benefits associated with these changes are concentrated among workers possessing advanced technical skills and educational qualifications. The evidence presented by Acemoglu and Restrepo (2020) suggests that robot adoption can negatively affect employment and wage outcomes in occupations vulnerable to automation. This finding supports the view that technological progress is not inherently inclusive and may exacerbate existing labor market inequalities when workforce adaptation mechanisms are insufficient. The discussion also highlights the growing importance of skill polarization as a driver of employment inequality. Digital economies increasingly reward analytical capabilities, technological expertise, and problem-solving competencies. Workers who possess these attributes are more likely to experience wage growth, occupational mobility, and long-term employment security. Conversely, workers lacking access to education and digital skills training face increased vulnerability to labor market exclusion. Brynjolfsson et al. (2021) argue that the productivity gains generated by digital technologies are strongly linked to complementary investments in knowledge, organizational capabilities, and intangible assets. This relationship helps explain why technological advancement often benefits highly skilled workers more than other segments of the labor force. The findings of Yang et al. (2023) further reinforce this interpretation by demonstrating that digital economic development contributes to widening wage gaps between high-skilled and low-skilled workers. Another important implication concerns the expansion of the gig economy and platform-based employment. Digital platforms have undoubtedly increased labor market flexibility and created new opportunities for income generation. Nevertheless, these opportunities frequently exist outside traditional employment arrangements and are often characterized by reduced employment protection, uncertain earnings, and limited access to social benefits. The findings suggest that platform work represents a new form of labor market segmentation in which workers enjoy greater flexibility but face increased economic insecurity. This observation aligns with the findings of Li et al. (2025), who identified multiple structural factors encouraging participation in gig economy employment. While digital platforms can improve labor market accessibility, they may simultaneously institutionalize precarious employment conditions that reinforce socioeconomic inequality.

The results also reveal the complex relationship between digital transformation and gender inequality. On one hand, digital technologies create opportunities for greater economic participation by expanding access to financial services, remote work arrangements, and entrepreneurial activities. Research by Guo et al. (2021) and Wang et al. (2024) suggests that aspects of digital economic development can contribute to narrowing gender wage disparities. On the other hand, persistent labor market segmentation continues to generate unequal outcomes for women. The findings of Li et al. (2024) and Han et al. (2024) indicate that gender wage gaps remain evident across sectors and may even widen within certain digital employment contexts. These contrasting outcomes suggest that technological innovation alone cannot eliminate structural inequalities rooted in institutional practices, occupational segregation, and social norms. Regional disparities represent another critical dimension of the discussion. Digital transformation has accelerated economic development in regions possessing advanced technological infrastructure and strong innovation ecosystems. However, the unequal

distribution of digital resources contributes to geographic variations in employment opportunities and economic outcomes. The findings indicate that workers located in underserved regions often face barriers to participation in digital labor markets, limiting their ability to benefit from technological progress. This observation supports the arguments of Long et al. (2016), who emphasized the importance of resource allocation and regional development in shaping socioeconomic opportunities. Consequently, addressing labor market inequality requires attention not only to individual skills but also to broader structural factors influencing access to digital resources. The experience of the COVID-19 pandemic further illustrates the relationship between digital transformation and employment inequality. The rapid transition toward remote work and digital service delivery highlighted the importance of technological access and digital literacy. Workers capable of adapting to online environments generally maintained stronger labor market attachment, whereas individuals lacking access to digital infrastructure experienced greater economic vulnerability. Studies by Bond et al. (2021), Van Lancker and Parolin (2020), and Leal Filho et al. (2021) collectively demonstrate that crises often amplify pre-existing inequalities. The pandemic therefore served as a practical example of how digital divides can translate directly into unequal employment outcomes. Overall, the discussion suggests that digital transformation is neither inherently beneficial nor inherently detrimental to labor market equality. Rather, its effects depend on the interaction between technological innovation, institutional frameworks, educational systems, and social policies. Without targeted interventions, digitalization may continue to reinforce labor market segmentation and widen employment disparities. Conversely, inclusive policies emphasizing skills development, workforce retraining, social protection, and equitable access to digital infrastructure can help ensure that technological progress contributes to broader economic inclusion and sustainable labor market development.

6. CONCLUSION

This study examined the relationship between labor market segmentation and employment inequality in the era of digital transformation, focusing on the ways technological advancements reshape employment structures, wage distribution, and workforce participation. The analysis demonstrates that digital transformation has become a major force influencing labor market dynamics across both developed and developing economies. Through the expansion of automation, artificial intelligence, digital platforms, and digital economic systems, technological innovation has altered traditional employment relationships and created new opportunities for economic growth. However, these opportunities are not distributed equally, resulting in significant disparities among workers, sectors, and regions. The findings indicate that automation and artificial intelligence have accelerated changes in occupational structures by reducing the demand for routine labor while increasing demand for highly skilled workers. This process contributes to skill polarization, which has emerged as one of the most significant drivers of employment inequality in the digital era. Workers with advanced educational qualifications and technological competencies benefit from higher wages, improved job security, and enhanced career prospects. In contrast, low-skilled workers face greater risks of job displacement, income instability, and limited opportunities for occupational advancement. These outcomes demonstrate that technological progress can reinforce existing labor market divisions when adequate support mechanisms are absent. The study also reveals that digital transformation has contributed to the emergence of new forms of labor market segmentation through the expansion of platform-based and gig economy employment. While digital platforms create flexible work opportunities and increase labor market participation, they frequently expose workers to precarious employment conditions characterized by uncertain earnings and limited social protection. Consequently, the digital economy simultaneously expands employment opportunities and generates new forms of inequality that challenge conventional labor market institutions. Gender-related disparities remain an important aspect of employment inequality within digitally transforming economies. Although digital technologies can improve access to economic opportunities and reduce certain barriers to workforce participation, significant wage gaps and occupational inequalities persist. The evidence suggests that technological advancement alone is insufficient to eliminate structural

inequalities embedded within labor markets. Effective policy interventions remain necessary to address disparities associated with gender, education, occupation, and socioeconomic status. The findings further demonstrate that regional inequalities play a crucial role in shaping labor market outcomes. Access to digital infrastructure, technological resources, and educational opportunities significantly influences the ability of individuals and communities to participate in the digital economy. Regions possessing advanced technological capabilities are better positioned to benefit from digital transformation, while underserved areas risk falling further behind. This geographic dimension of inequality highlights the importance of inclusive development strategies that promote equitable access to digital technologies and economic opportunities. The broader implication of this study is that digital transformation should be viewed as a socioeconomic process rather than merely a technological phenomenon. Its consequences extend beyond productivity gains and economic growth to include fundamental questions regarding fairness, inclusion, and social sustainability. Policymakers, educational institutions, employers, and other stakeholders must therefore work collaboratively to ensure that the benefits of technological innovation are distributed more equitably across society. Investments in education, digital literacy, workforce reskilling, and social protection systems will be critical for reducing employment inequalities and improving labor market resilience. Labor market segmentation and employment inequality remain central challenges in the era of digital transformation. While digital technologies offer unprecedented opportunities for innovation, productivity, and economic development, they also create risks associated with exclusion, polarization, and unequal access to opportunities. Achieving inclusive and sustainable labor market outcomes requires a balanced approach that promotes technological advancement while simultaneously addressing the structural inequalities that shape employment experiences. Through comprehensive policy frameworks and continued investment in human capital development, societies can better harness the benefits of digital transformation while minimizing its adverse effects on vulnerable workers and disadvantaged populations.

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