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Exploring Nature and Causes of Skills Mismatch in Informal Economy

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Abstract
The informal economy is a vital component of global labor markets but is frequently hindered by the challenge of skills mismatch. This paper explores the nature and causes of skills mismatch in the informal economy, discussed in existing literature. There are mainly four types of mismatch: horizontal mismatch, where workers' roles do not align with their educational qualifications; vertical mismatch, involving discrepancies between job demands and workers' educational levels; skill gaps, which indicate deficiencies in specific abilities needed for effective job performance; and skill obsolescence, where previously relevant skills lose their utility over time. The several factors driving these mismatches include : Educational system inefficiencies, Labor market dynamics, Regional and Sectoral variations ,Workers' characteristics and decisions, shaped by personal preferences and socio-economic circumstances, global trends like automation and demographic changes, sociological factors, including cultural norms and policy and institutional shortcomings .

Keywords: informal Economy, Skills Mismatch, Skill Gaps, Vertical Mismatch, Horizontal Mismatch, Skill Obsolescence, Labor Market Challenges.

1. Introduction

The informal economy, which employs around 2 billion workers globally (approximately 60% of the workforce), is crucial for poverty alleviation and employment, especially in developing countries. It provides a vital safety net for individuals excluded from formal employment due to barriers like education and financial resources. Despite its importance, this sector is often stigmatized as unethical, though most participants seek honest livelihoods. Informal workers face challenges such as low wages, job insecurity, and lack of social protection, necessitating policies that promote inclusive economic growth and reduce inequalities. A significant research gap exists regarding jobs and skills mismatches within the informal economy, as most studies focus on formal sectors. Skills mismatches, including skill gaps and over-education, hinder labor market efficiency and economic productivity but remain underexplored in informal contexts.

The present paper attempts to explore the nature and causes of skills mismatch in informal economy. The objective of the paper is twofold. Firstly, to discuss different types of skills mismatch and secondly to explain the reasons for skills mismatch in informal economy.

2. Skills Mismatch in Informal Economy

The informal economy constitutes a significant share of global economic activity, particularly in developing countries, where it accounts for over 50% of non-agricultural employment [35] and 61% of the global workforce [188]**.** This sector encompasses a diverse range of activities, including small-scale enterprises, self-employment, and wage employment, often operating without regulation, social protection, or formal contracts [22, 49]. It serves as a vital safety net during economic crises and plays a major role in job creation [128]**.**

The informal economy contributes between 25% and 50% of non-agricultural GDP in various regions [32]**.** Its origins can be traced to post-World War II urban labor surpluses and rural-urban migration [141]**.** However, the sector faces challenges such as skills mismatches, including over- or under qualification, skill gaps, and obsolescence, which hinder productivity and transition to formal employment [42]**.**

Perspectives on the informal economy's role vary widely, with debates on its benefits for employment versus its

challenges in providing secure livelihoods [41]. To address these issues, the International Labour Organization advocates for decent work through employment opportunities, worker rights, social protection, and social dialogue [178]. A comprehensive approach, encompassing macroeconomic policies, governance reforms, productivity enhancement, and representation, is essential for integrating informal workers into inclusive and sustainable economic frameworks [34, 178].

2.1. Types of skills mismatches:

Skill mismatch, a discrepancy between workers' abilities and job requirements, is a significant issue in labor markets worldwide. Skills mismatch encompasses various forms of labor market friction, including vertical mismatch (over/underqualification), horizontal mismatch (field of study mismatch), skill gaps, skill shortages, and skill obsolescence [123, 124].

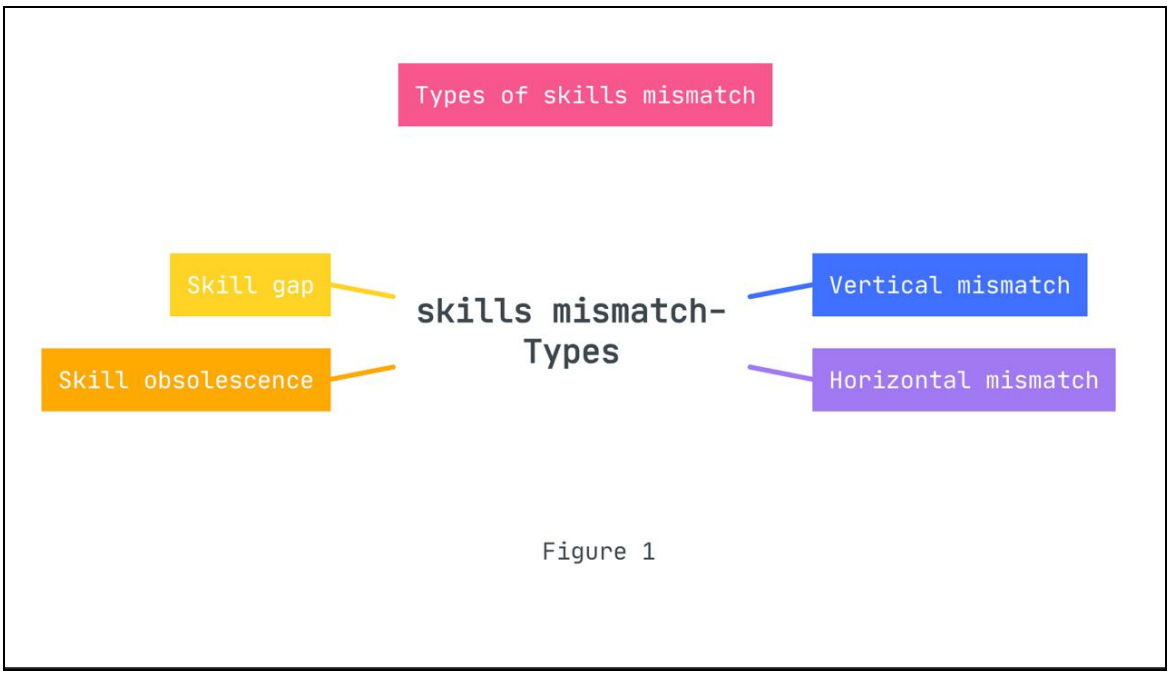

Figure 1

Vertical Mismatch occurs when an individual's educational level is not aligned with their job requirements, characterized by overeducation or undereducation [123, 124]. Horizontal Mismatch arises when there is a discrepancy between an individual's field of study and their occupation [126, 170]. Skill Gap is defined as the disparity between the skills employers demand and the skills the workforce possesses, impacting job performance and productivity [25, 26]. Skill Obsolescence represents the depreciation of skills due to technological evolutions and industry shifts [25, 86].

These types of mismatch have different causes and consequences, requiring distinct policy approaches [42]. Vertical mismatch is more prevalent than horizontal mismatch, with overeducation being more substantial than undereducation [90]**.** The incidence of mismatch is reduced in the long term, and graduates from occupation-specific fields are less likely to be mismatched [107]. The incidence of skill mismatch is influenced by contextual conditions, occupational factors, and individual characteristics [167]**.** Cyclical skill mismatch, particularly during recessions, can have long-term effects on graduates' careers [112]. Education mismatch, a related concept, includes vertical (level of study) and horizontal (field of study) mismatches [163]. It can be measured through various approaches, including subjective self-assessments and objective methods [138]. Addressing skill mismatch requires consideration of both labor supply and demand factors [51]**,** as mismatches can occur due to deficiencies on either side [160]. Measuring skills mismatch, especially cognitive skills mismatch, in cross-national studies presents challenges due to data limitations and methodological differences [119].

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3. Factors contributing to Skills Mismatch

Several factors contribute to the skills mismatch observed in labor markets, particularly within the informal economy. It is a global phenomenon influenced by multiple interacting factors. These include rigid educational systems, technology-driven skill changes, demographic and regional disparities, and market inefficiencies.

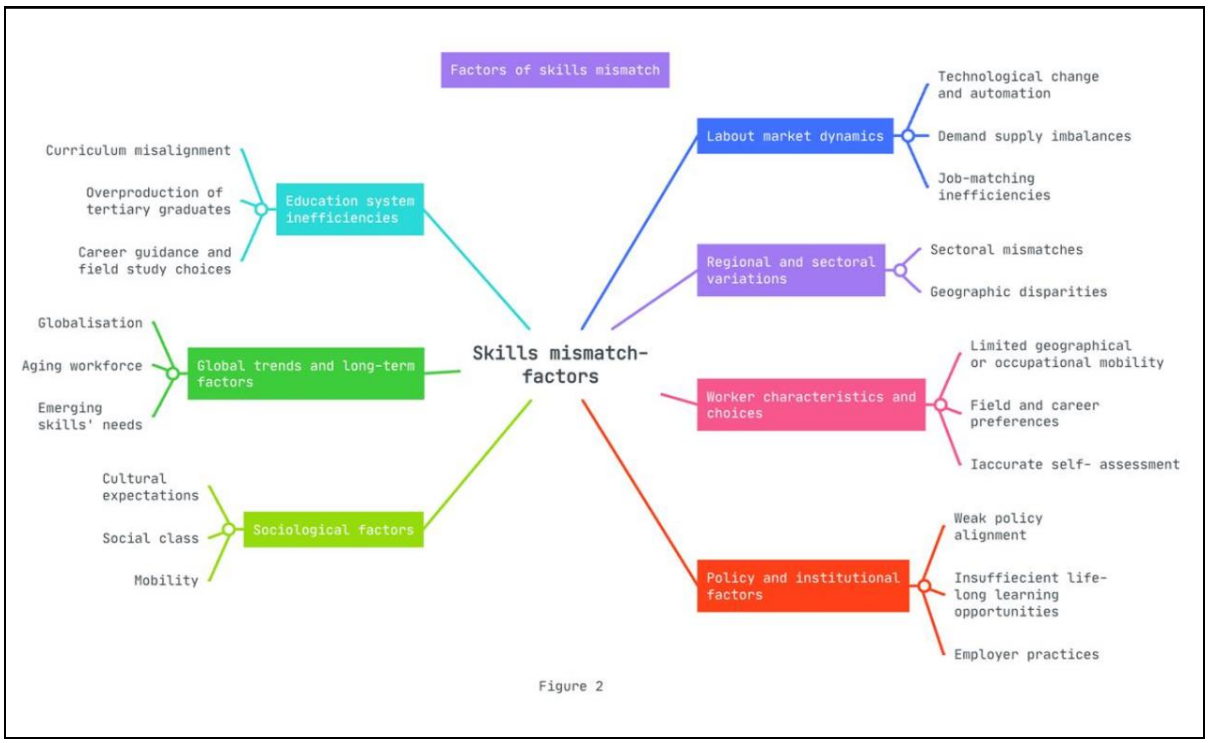

Figure 2

3.1 Educational System Inefficiencies:

Educational system inefficiencies significantly contribute to skills mismatch by failing to align curricula with current labor market demands. Many educational institutions emphasize theoretical knowledge over practical skills, resulting in graduates who lack the competencies needed by employers. Additionally, inadequate communication between educational authorities and industry stakeholders exacerbates this issue, as schools do not receive timely feedback on the evolving skill requirements, leading to a workforce that is ill-equipped for available jobs.

3.1.1Curriculum Misalignment:

Skills mismatches between graduates and labor market demands are a significant global issue, manifesting as vertical misalignment (over- or underqualification) and horizontal misalignment (field of study mismatch) [160, 90]. These mismatches stem from outdated curricula, insufficient development of soft skills, inadequate digital literacy, and misaligned learning outcomes [179, 177].

The gap between the skills graduates possess and those employers demand—particularly in communication, critical thinking, IT proficiency, and teamwork—negatively impacts employability, wages, productivity, and job satisfaction [140, 23; 161]. This issue is especially pronounced in technical fields like IT and engineering, where industry requirements evolve rapidly [10, 123].

Addressing these gaps requires updating academic content, modernizing facilities, and enhancing job search strategies to improve alignment between educational outcomes and labor market needs [177, 164]. Additionally, the increasing demand for soft skills in the data-driven economy highlights the need for a balanced focus on both technical and interpersonal competencies [23].

3.1.2 Overproduction of Tertiary Graduates:

The literature on job-education mismatch and overeducation underscores its growing prevalence and consequences worldwide, particularly among young, highly educated workers [162]. Overeducation often arises from educational expansion outpacing job creation and labor market segmentation [79, 134]. The mismatch leads to wage penalties, slower wage growth, and decreased job satisfaction [150, 36].

In developing countries, overeducation is more pronounced due to weak job creation, limiting returns on educational investments [13, 79]. While some studies report stable graduate earnings premiums despite overeducation [59], others highlight increasing vertical mismatches and skills imbalances [63]. However, evidence on trends is mixed, with some findings suggesting declining overeducation rates [48].

Educational expansion is not uniformly detrimental; policies promoting higher education may, in some contexts, reduce mismatch by improving workforce adaptability [133]. Theories like [71] endogenous professionalization suggest that labor market shifts can drive excessive degree attainment. Addressing mismatch requires nuanced policy interventions to balance educational expansion with job market demands.

3.1.3 Career Guidance and Field of Study Choices:

Horizontal mismatch, where graduates work in jobs unrelated to their field of study, affects about one-third of workers and leads to wage penalties and reduced job satisfaction [152, 170]. Fields with occupation-specific training experience lower mismatch rates, while stronger school-to-work pathways result in better earnings for matched workers but greater penalties for mismatched ones [107, 20]. Psychological empowerment can mitigate the negative impact of mismatch on well-being [185]. Enhanced career guidance and labor market orientation are critical to addressing mismatch, as many students make career decisions based on personal background rather than labor market demands [72].

Vertical and horizontal mismatches in education and employment persist globally, affecting wages and employment outcomes [57, 101]. Factors such as asymmetric information, job search costs, and education system characteristics—such as stratification and vocational orientation—influence mismatch rates [33, 106]. Mismatched workers face wage penalties compared to well-matched peers [95, 149]. Addressing these mismatches requires aligning higher education with labor market needs, improving career counseling, and fostering entrepreneurial skills [6, 81, 101]. These measures can enhance job-market alignment and improve graduates' employment outcomes.

3.2 Labor Market Dynamics

Labor market structures and dynamics significantly influence the incidence of skills mismatch:

3.2.1 Technological Change and Automation:

Technological advancements frequently displace workers whose skills become obsolete. Digital transformation and automation have introduced new job roles requiring advanced digital skills, leaving workers with outdated technical skills behind [124, 180]. Skills mismatch in the labor market is shaped by technological advancements, globalization, and demographic shifts [25]. Individual characteristics, occupational factors, and demand-side dynamics significantly influence mismatch rates and outcomes [167, 51]. In Nigeria, a notable gap exists between university education and labor market demands, reflecting broader global patterns [140]. Skills mismatch affects earnings, job satisfaction, and wage inequality [181, 78].

The rise of new technologies intensifies skills gaps, highlighting the need for innovative social and policy interventions [43]. In the EU, increasing inequality is tied to imbalances in skill supply and demand, emphasizing the importance of targeted strategies [82]. Research underscores the underutilization of human capital in developed countries and the diverse nature of mismatch in low- and middle-income regions, calling for region-specific approaches [42, 123,124].

3.2.2 Demand-Supply Imbalances:

Labor market mismatches often result from uneven skill demand and supply, including an oversupply of workers with tertiary education and an undersupply of workers with specialized technical skills or vocational training [123, 124]. Skills mismatch in labor markets stems from factors such as demand-supply imbalances, structural changes, and educational misalignment. In Europe, globalization, digitalization, and institutional factors contribute to skill shortages [25]. In Nigeria, a significant mismatch, particularly in communication and IT skills, affects 60.6% of university graduates [140]. Labor demand characteristics play a crucial role in determining earnings differentials, underscoring the need for coordinated supply- and demand-side interventions [51]**.** Effective labor market information systems are essential for

aligning skills with job requirements [104], particularly in transition economies where educational systems often fail to meet market demands [102]. Field-of-study mismatches further complicate this issue, influenced by both supply- and demand-side dynamics [126]. Addressing these challenges requires targeted policy interventions to mitigate the economic costs of mismatch [154, 50].

3.2.3 Job-Matching Inefficiencies: Poor mechanisms for matching workers to jobs intensifies skills mismatch. Inaccurate job descriptions, lack of employer-worker communication, and inefficient job portals create barriers to effective job allocation [124, 74]. Research on job-matching inefficiencies highlights the negative effects of skills mismatch on productivity and unemployment [171]. Overeducation is particularly prevalent in less developed labor markets, driven by high job search costs [39]. Mismatches can take various forms, including vertical, horizontal, and skill gaps [123], with inefficient matching often stemming from information processing constraints [148]. Positive assortative matching, where workers' skills align perfectly with job requirements, is not guaranteed even when skills and job qualities are complementary [166, 40]. Structural inefficiencies, such as creating too few unskilled and too many skilled jobs, further exacerbate the issue [19]. Addressing these inefficiencies requires a holistic approach, including reforms in education, training systems, and wage-setting practices [145].

Local labor markets experience frictional mismatches due to employer characteristics and recruitment practices [2]**.** Even with complete information about workers' abilities, inefficient job assignments can occur [183]. Social networks in job searches often lead to suboptimal outcomes [29]. Effective solutions must address both supply- and demand-side dynamics to resolve mismatches, including constrained efficient equilibria where inefficiencies persist despite rational labor market behavior [45].

3.3 Regional and Sectoral Variations

Mismatch rates and their manifestations differ across sectors and geographic areas. Regional and sectoral variations in skills mismatch are significant, reflecting how mismatch rates differ across geographic areas and industries. For instance, in India, data indicates a stark concentration of low-skilled workers in certain states, with over 25% of the workforce in regions like Andhra Pradesh and Tamil Nadu classified as low skilled. Conversely, the availability of highly skilled workers is notably lower, with only a small percentage achieving higher skill levels across various sectors. This disparity is influenced by local economic conditions, educational infrastructure, and the specific demands of industries prevalent in those regions. Consequently, while some regions may experience high levels of overqualification due to an influx of educated individuals unable to find suitable employment, others may face acute skill shortages that hinder economic growth and development.

3.3.1. Sectoral Mismatches:

Some sectors, such as IT, finance, and healthcare, experience more significant challenges in finding workers with adequate skills due to faster rates of technological change and higher specialization requirements [124, 107]. For example, obsolescence is particularly prevalent in technology-intensive sectors. Technological advancements and skill mismatches significantly influence labor markets and productivity, especially in sectors like IT and finance [113]. Rapid technological change increases demand for skilled workers, creating mismatches that reduce productivity, particularly in developing countries where technologies are designed for skilled labor in advanced economies. Skill mismatches also contribute to wage inequality, disproportionately impacting low-educated workers and marginalized groups [12, 169].

Skill-biased technological change intensifies mismatches, increasing demand for high-skill labor while leaving gaps in middle- and low-skill occupations [24, 28]. Highly educated workers are often over-skilled, while women, immigrants, and older workers face under-skilling challenges [117]. On-the-job searches by mismatched workers increase wage inequality and disproportionately affect less-educated individuals [54]. These mismatches reduce average productivity [25], underscoring the need for policies promoting lifelong learning, labor market flexibility, and targeted skills training [117, 92]**.**

3.3.2 Geographic Disparities:

Regional mismatches stem from variations in economic structures, industry distributions, and the availability of skilled labor. Urban areas generally attract high-skilled roles but may lack sufficient supply, while rural areas often face mismatches due to limited local job diversity and education infrastructure [107, 139]. Geographic disparities in skill distribution and employment opportunities are evident between urban and rural areas. Urban regions attract high-skilled workers in roles requiring advanced social and problem-solving skills, such as scientists and executives, while rural areas often concentrate lower-skilled occupations [1, 125]**.** These disparities are driven by factors such as regional economic

structures, industrial specialization, urbanization levels, and local institutional capacity, leading to increasing spatial mismatches, particularly for low-skilled workers [176, 60]. Racial residential segregation and limited transportation access further exacerbate these mismatches for minority groups [174], creating self-reinforcing employment inequalities and low-skill traps in certain areas [136].

In developing countries, spatial inequality is influenced by natural advantages and agglomeration forces, leading to urban-rural economic clustering and widening disparities [182, 91]. Labor market mismatches, stemming from the suboptimal allocation of workers across sectors, contribute to unemployment and productivity losses [171]. Talent tends to cluster in regions with greater diversity and high-technology industries, intensifying agglomeration effects [64, 175].

3.4 Worker Characteristics and Choices

Research emphasizes the dynamic relationship between individual characteristics and labor market conditions. Workers experiencing higher skill mismatches are more likely to change jobs in search of better matches, which can enhance wages and aggregate productivity [131, 70]. Skill mismatches, defined by gaps between required and possessed skills, influence wage growth and career progression [77]. Job mobility decisions are often driven by subjective evaluations of job characteristics rather than objective factors [70]. Match quality significantly impacts entry wages and job separations, with varying effects depending on worker experience and employment status [66]. Career-specific concerns also shape mobility, with losses from career disappearance outweighing those from job loss [137]. Addressing these dynamics through effective policies is crucial for reducing mismatch and enhancing labor market outcomes [145].

Persistent unemployment disparities across metropolitan areas stem from skill mismatches, regional characteristics, and high moving costs [144]. Workers sort into jobs based on multidimensional skills, which evolve over time [111]. Mismatch affects wages, job separations, and wage growth differently for experienced versus inexperienced workers [67]. General training provides long-term value under uncertain labor conditions [75] whereas, Worker-job surplus, shaped by specific characteristics of workers and jobs, influences matching decisions in the labor market [109, 27].

3.4.1 Limited Geographic or Occupational Mobility:

Workers may be unable or unwilling to relocate to areas with better job alignments due to financial, social, or personal constraints. Similarly, a lack of occupational mobility limits workers' ability to transition into roles requiring different skills [123, 124]. Recent research underscores the intricate relationship between geographic and occupational mobility in shaping labor market outcomes. Geographic mobility often yields greater wage improvements occupational shifts but is constrained by financial, personal, and regulatory barriers [37, 147]. Barriers to occupational mobility include task-related costs, skill dissimilarities, and financial constraints, which can significantly limit workers' ability to transition between roles [69, 80]. Gender disparities in geographic mobility further contribute to career inequalities [120]. Regional mobility is often influenced by job displacement, though family ties play a crucial role in migration decisions [84]. Occupational mobility patterns are shaped by economic and social factors. Workers tend to move towards roles where their skills are more scarce, with transitions often predicted by skill similarity [65]. Mobility follows a U-shaped trend relative to workers' wage positions, with low- and high-wage earners more likely to transition than those in the middle [94]. Financial constraints and social attachments, such as community ties, frequently outweigh financial incentives in migration decisions [44]. Discrimination also poses barriers to mobility for certain groups [56].

3.4.2 Field and Career Preferences:

Job seekers' career choices and preferences can lead to mismatches. For instance, some choose less aligned but higher-paying jobs (e.g., working in management despite degrees in sciences), while others select occupations with more flexible conditions at the expense of skill alignment [139]. Many individuals prioritize higher-paying jobs outside their expertise, contributing to mismatches [26, 163]. Job search strategies and employability skills also significantly impact mismatch outcomes, which vary by field of study, university type, and gender [16, 3]. Economic conditions at graduation can result in persistent career setbacks and increased mismatch likelihood [112]. Mismatched workers often face wage penalties, lower job satisfaction, and regret over study choices, underscoring the importance of aligning skills with occupational needs [170]. Standardized definitions of mismatch and a balance between general and occupation-specific skills are critical to addressing this issue [124, 170]. PhD students often shift career preferences away from academia despite advisor encouragement, reflecting broader misalignments between career expectations and labor market realities [157, 72]. Mismatches are particularly common among graduates from less occupation-specific fields and disproportionately affect late-career scientists [107, 15]. Job search behaviors, including composition externalities, can

exacerbate suboptimal outcomes [47].

3.4.3 Inaccurate Self-Assessment:

Workers often overestimate or underestimate their skills, leading to poor job matching or lower employability [124]. Research shows that individuals often misjudge their abilities, leading to both overestimation and underestimation. This inaccuracy is influenced by lack of skill, preexisting self-views, and motivational factors [93, 31, 58]. Self-assessment errors occur across various domains, including health, education, and the workplace [55]. In academics, students frequently overrate their employability skills compared to faculty assessments [88]. Factors such as ability, feedback, self-efficacy, and goal orientation impact self-assessment accuracy [129]. For example, in medical residencies, lower-performing residents overestimate their skills, particularly in interpersonal and communication areas [110]. These inaccuracies have implications for career decisions and professional growth.

The "unskilled-and-unaware" phenomenon shows that less competent individuals tend to overestimate their abilities, though feedback can mitigate this effect [98, 97]. Overconfidence in workers impacts labor markets, affecting effort levels, compensation, and productivity [156]. Skills mismatch reduces earnings, job satisfaction, and overall productivity [160].

3.5 Policy and institutional factors

Policy and institutional factors at both national and organizational levels significantly contribute to skills mismatch in the labor market. Ineffective educational policies often fail to align training programs with the evolving needs of industries, resulting in graduates who lack relevant skills for available jobs. Additionally, regulatory frameworks that restrict labor mobility or impose rigid employment protection can hinder the efficient allocation of talent, exacerbating mismatches. For instance, stringent hiring and firing regulations may discourage businesses from adapting their workforce to meet changing demands, while inadequate support for lifelong learning limits workers' opportunities to update their skills. Furthermore, a lack of collaboration between educational institutions and employers can lead to a disconnect in understanding the specific competencies required in various sectors.

3.5.1 Weak Policy Alignment:

A recurring critique in the literature is the lack of alignment between education systems and labor market demands. Policy measures focusing primarily on educational attainment rather than skill relevancy fail to address mismatches effectively [123, 124] The literature consistently highlights a significant mismatch between education systems and labor market demands, leading to skills gaps and reduced productivity [145, 135, 46]. This misalignment is particularly pronounced in transition economies, where rapid economic restructuring and outdated education systems contribute to large imbalances [102]. While many policy interventions focus on reforming education and training [184], there is growing recognition that wage-setting practices also play a crucial role in addressing skills mismatch [180]. The "missing middle" in education policy, referring to the overlap between academic and applied learning, requires attention to strengthen the education-work relationship [30]. Strengthening links between education and the labor market is seen as essential for improving outcomes [103]. However, the focus has primarily been on supply-side solutions, with less attention given to employers' rigid skill requirements [145]. Strong school-to-work pathways can lead to better labor market outcomes, including higher earnings and reduced unemployment risk [20].

3.5.2 Insufficient Lifelong Learning Opportunities:

The limited availability of reskilling or upskilling programs compounds skill gaps. Workers, especially those in rapidly advancing industries, struggle to keep pace with new demands because lifelong learning initiatives are underdeveloped in many labor markets [124, 145] . The rapid pace of technological change has intensified skill gaps, requiring a shift towards lifelong learning and continuous skill development [92]. Workers must acquire a combination of cognitive, technical, and non-cognitive skills to remain competitive [92]. Industry 4.0, characterized by automation and digital transformation, has made reskilling and upskilling imperative, with an estimated 50% of employees needing reskilling by 2025 [108]. Initiatives like Singapore’s Skills Future aim to address these challenges, but barriers such as access to learning opportunities persist, particularly for informal economy workers [68, 143].

The importance of lifelong learning is also underscored by Industry 5.0, where digital competencies and adaptability are critical [7]. Organizations are investing in upskilling programs to mitigate automation's impacts, though challenges remain in designing effective training and addressing socio-economic disparities [165, 73]. Hard and soft skills face differing risks of obsolescence, with digital and interpersonal skills becoming increasingly vital [159]. A multi-faceted

approach involving industry-academia partnerships, personalized learning pathways, and balanced focus on technical and soft skills is essential [5, 158]. Fostering a culture of continuous learning is critical for individual career growth and

3.5.3 Employer Practices:

Employers may worsen mismatch issues through rigid hiring criteria, insufficient training programs for employees, or inadequate investments in workforce development [145]. Employer practices significantly contribute to labor market mismatches through rigid hiring criteria, limited training programs, and inadequate investments in workforce development [52, 2]. Smaller employers are less likely to provide formal training, while larger employers face higher monitoring costs in training investments [11]. Employers adopting high-performance work systems, however, are more inclined to invest in workforce development [116]. Skills mismatch is particularly pronounced in white-collar roles, where employers often perceive gaps between job training outcomes and their requirements [115]. Mismatch stems from both supply and demand factors, such as changes in educational attainment, evolving job skill requirements, and institutional factors [78]. On the supply side, overeducation and worker qualifications exceeding job needs can limit earnings and access to employer-sponsored training [18, 51]. On the demand side, rigid wage-setting practices and inflexible skill requirements exacerbate mismatches [145,146].

3.6 Global Trends and Long-Term Factors

Broader systemic changes shape the trajectory of skills mismatch on a global scale: Global factors play a crucial role in contributing to skills mismatch, presenting a multifaceted challenge for labor markets around the world. Globalization has heightened competition and altered job structures, leading to a demand for skills that can keep pace with rapid changes in various industries. Simultaneously, technological innovations are reshaping the workforce, creating a need for new skill sets that many workers lack. For example, the emergence of the digital economy requires expertise in digital and sustainable practices, while educational systems often struggle to keep up with these evolving demands, resulting in a workforce that is not adequately equipped for available positions.

Moreover, demographic shifts such as an aging population and changing migration trends are influencing the dynamics of labor supply and demand. Young individuals frequently face unemployment or underemployment due to insufficient relevant skills, a situation worsened by economic disruptions like the COVID-19 pandemic and challenges posed by climate change, which complicate access to education and job opportunities.

3.6.1 Globalization:

Trade liberalization and outsourcing of specific labor-intensive processes have reduced job opportunities domestically while increasing skill gaps. Multinational trade systems demand specific expertise that is often unavailable locally [139]. Globalization and trade liberalization have significantly reshaped labor markets, contributing to wage inequality and skill gaps worldwide. Outsourcing and international trade have increased demand for skilled labor in both developed and developing countries, as multinational firms relocate less skill-intensive tasks abroad while retaining higher-skill activities domestically [62, 121]. This shift has widened the wage gap between skilled and unskilled workers [130, 168]. The effects vary based on trading partners, with trade involving low-wage countries often driving skill-upgrading in high-wage nations [151].

3.6.2 Aging Workforce:

Demographic changes, such as the increasing proportion of older workers in many economies, challenge workforce adaptability. Older workers may experience obsolescence as they face difficulties acquiring new skills Population aging exacerbates skill mismatches in labor markets through cognitive decline, which reduces adaptability and comparative advantages in skill-intensive industries [76]. Older workers are particularly affected, with low-skilled individuals facing greater mismatches [4, 190]. However, older workers tend to overutilize their skills more than younger ones, potentially earning wage premiums [21]. The skill income gap's dynamics are influenced by increased skill supply narrowing the gap, while skill-biased technological changes widen it [38]. Strategies like adult training and leveraging artificial intelligence can mitigate the effects of aging on labor resource allocation [4, 190], while capital-skill complementarity may offset some negative impacts [87, 96]

3.6.3Emerging Skills Needs:

Technological revolutions, such as in artificial intelligence, renewable energy, or robotics, require skills that did not exist in earlier eras. Educational systems and labor markets often fail to predict and train for these needs adequately . The rise of artificial intelligence (AI), robotics, and renewable energy technologies is reshaping labor markets, driving skill

mismatches as outdated skills become obsolete and new ones are demanded [43, 155]. Industry 4.0 technologies in renewable energy require workers to develop advanced digital skills [8]. AI and robotics are automating middle-paid jobs like paperwork while creating opportunities in knowledge-intensive fields [61, 118]. Workers with adaptable skills, particularly in science and engineering, are less susceptible to displacement by automation [127]. Notably, robots have positively impacted manufacturing employment in some U.S. regions [105]. To bridge skill gaps, strategies such as lifelong learning, strategic human resource management, and AI-driven skill-matching systems are being developed [155, 132].

Globally, AI and automation are transforming skill demands, requiring critical thinking, complex problem-solving, and emotional intelligence for future work [172]. Skills mismatches are particularly concerning in low- and middle-income countries, where they hinder productivity and workforce participation [42, 78]. These mismatches are shaped by globalization, digitalization, and structural labor market changes [25]. Although fears of large-scale job losses from automation are overstated, significant skill disruptions are expected within the next decade [188].

3.7 Sociological Factors

Mismatches are also mediated by sociological variables: Sociological factors significantly influence the occurrence of skills mismatch in the labor market. One important element is the disparity in information available to job seekers and employers, which can result in individuals being unaware of the specific skills that are currently in demand. This often leads to situations where individuals are either overqualified or possess skills that do not align with available job opportunities. Young graduates, for example, may enter the workforce only to find that their degrees do not correspond with the roles they secure, largely due to insufficient career guidance and support. Moreover, social networks and cultural expectations can shape career decisions, steering individuals toward certain professions even when those fields do not match their skill sets. Societal pressures may lead underrepresented groups to pursue educational paths that do not align with labor market needs, further intensifying the mismatch. Additionally, economic inequalities can restrict access to quality education and training, resulting in a workforce that is either overprepared for low-skilled jobs or underprepared for high-skilled roles. Collectively, these sociological factors underscore the intricate relationship between individual choices, societal influences, and labor market trends in contributing to skills mismatch.

3.7.1 Cultural Expectations:

In some societies, there is an overemphasis on attaining formal higher education qualifications, even when technical or vocational paths may be more aligned with labor market demands. This leads to widespread overeducation [99]. Cultural expectations and societal norms can lead to an overemphasis on formal higher education, resulting in overeducation and skill mismatches [142, 173]. This mismatch is observed across different countries and sectors, with employers often struggling to find candidates with suitable qualifications [14, 160]. Research indicates that skills mismatch, particularly overeducation, is a prevalent issue in both developed and developing labor markets [17, 161]. This mismatch often results from an overemphasis on formal higher education qualifications, even when vocational paths may better align with market demands [46, 102]. Overeducation can lead to lower job satisfaction, wage penalties, and inefficient resource allocation [17, 53]. While vocational education may reduce mismatches early in careers, this advantage diminishes over time [176]. The mismatch can be influenced by factors such as economic cycles, cultural backgrounds, and the alignment between educational institutions and labor market needs [112, 89].

3.7.2 Social Class:

Socioeconomic disparities influence access to quality education or career guidance, increasing the likelihood of mismatch for disadvantaged groups. Sociological studies suggest that individuals from lower socioeconomic backgrounds may be overrepresented in low-quality education systems that are poorly aligned with labor market needs Research highlights the significant role of social class, mobility, and geography in shaping skills mismatch in education and employment. Individuals from lower social origins face higher rates of overeducation, while those from higher social origins are more likely to be undereducated [189]. Cultural mismatches between working-class interdependence and middle-class independence norms further hinder educational and professional opportunities for working-class individuals [173]. Intergenerational mobility, class structures, and economic recessions exacerbate mismatches, particularly for college graduates [99, 112]. Lower socioeconomic backgrounds also correlate with reduced investment in skills development, perpetuating disparities [114].

3.7.3 Mobility:

Geographical mismatches, particularly in metropolitan areas, intersect with skills mismatches to influence labor market outcomes. Racial and minority groups are disproportionately affected, with spatial barriers limiting access to employment [83, 174]. Various forms of mismatch, including vertical (education level), horizontal (field of study), and skill gaps, disrupt labor market dynamics [124]. School curricula significantly impact social mobility, with labor markets favoring subjects like mathematics and languages [85].

Cognitive, noncognitive, and genetic factors influence intergenerational mobility, with skill transmission explaining a significant share of social mobility [122, 153]. Labor demand plays a larger role than supply in shaping earnings disparities and participation in employer-sponsored education [51]. Addressing skills mismatch requires tackling both labor market supply and demand factors to improve employment outcomes and equity. [1]

4. Conclusion

Skills mismatch arises from a complex interplay of educational, economic, institutional, and sociological factors. Educational misalignment, technological change, inefficient job-matching systems, and weak policies emerge as major contributors. Moreover, regional disparities, worker preferences, and sociological contexts further exacerbate the problem. Addressing skills mismatch requires coordinated efforts across multiple fronts, including reforms in educational systems, more responsive labor market policies, and investments in lifelong learning initiatives. Improved alignment between education and workforce demands is critical to mitigating these issues and fostering inclusive economic growth.

- **Conflict of Interest**

The authors declare that they have no conflict of interest

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