

The Impact of Education Mismatch on Employee Performance in the Public Sector: A Narrative Literature Review with Implications for Contract-Based Government Employees

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Abstract: Education mismatch-where there's a gap between what someone studied and what their job actually requires-has become a real concern in today's labor markets. This is especially true in the public sector. This literature review brings together existing research on education mismatch and what it means for how employees perform, with a particular focus on contract-based government workers like Indonesia's Pegawai Pemerintah dengan Perjanjian Kerja (PPPK). We look at three main types of mismatch: vertical mismatch (being overeducated or undereducated for your position), horizontal mismatch (working outside your field of study) and how these affect employee performance. What we found is that education mismatch does impact productivity, job satisfaction, turnover intentions and overall work performance-though how much and in what direction varies quite a bit depending on the context. Interestingly, the public sector has some unique features that seem to change how education mismatch affects performance. This review identifies the theoretical frameworks that help explain education mismatch, documents what research has found about performance impacts and suggests where future research should head-particularly for contract-based public employment systems. Our findings suggest that while education mismatch creates challenges for both employees and organizations, smart human resource management strategies can help reduce the negative effects and even make the most of mismatched workers' skills.

Keywords: Education Mismatch, Overeducation, Employee Performance, Public Sector, PPPK, Job Satisfaction, Productivity, Human Capital

INTRODUCTION

For decades, researchers in human capital theory and labor economics have grappled with how education connects to job outcomes [1,2]. The traditional view has been straightforward: more education equals better job performance and career prospects. But reality, as research increasingly shows, is messier than that. We're seeing more and more cases of education mismatch [3,4]. This happens when workers' educational credentials don't line up with what their jobs require. Sometimes workers are overeducated-they have more formal education than their position needs. Other times they're undereducated, lacking the typical educational requirements for their role [5]. And then there's horizontal mismatch, where people end up working in fields completely different from what they studied, even if their education level is appropriate [6].

The numbers are striking. Across both developed and developing countries, education mismatch has grown

substantially. Recent data suggests somewhere between 33 and 45% of college graduates face some form of qualification mismatch [7,8]. This isn't just an abstract problem. Individual workers often face real consequences-lower wages [9,10], less job satisfaction [11] and limited career mobility [12]. Organizations aren't immune either. They may see drops in productivity [13,14] and face higher turnover costs [15]. And for societies that pour substantial resources into education systems, the implications are worth serious consideration.

The public sector presents its own set of challenges when it comes to education mismatch. Government organizations have long emphasized formal educational credentials in hiring and promotions. Yet they also operate under constraints that private companies don't face-limited wage flexibility, restricted position mobility and performance-based compensation systems that aren't always as direct [16]. These structural features

might make education mismatch effects worse or they might buffer against them. Understanding these dynamics matters especially for contract-based public sector employment systems. Take Indonesia's Pegawai Pemerintah dengan Perjanjian Kerja (PPPK), for instance, where employees work under fixed-term contracts with performance-based renewal decisions [17].

PPPK represents a major piece of Indonesia's civil service reform. It was introduced to give the government more workforce flexibility while keeping professional standards intact [18]. Unlike Permanent Civil Servants (PNS), PPPK employees get appointed through contracts and their performance directly affects whether those contracts get renewed and how their careers progress. This performance-contingent system makes understanding what affects PPPK employee performance particularly important. And education mismatch may well be one of those key factors.

Despite all the research on education mismatch in private companies and among permanent employees, we haven't paid enough attention to how it affects performance in contract-based public sector jobs. This gap is especially notable given that these positions have distinct motivational structures [19], different career paths and unique performance evaluation systems. Beyond that, while systematic reviews have examined how education mismatch affects wages and employment [4,20], we still lack comprehensive narrative syntheses that really dig into the complex relationship between education mismatch and employee performance.

This literature review aims to fill those gaps. We're bringing together existing research on education mismatch and what it means for employee performance, paying special attention to contexts relevant for contract-based public sector workers. We've chosen a narrative approach because this research domain is characterized by diverse methodologies, different theoretical perspectives and varying contextual factors [21,22]. Unlike systematic reviews that stick to narrow, well-defined questions using rigid protocols, narrative reviews let us explore complex topics more broadly-especially where different research traditions intersect and where context matters [23].

This review has four main objectives. First, we want to establish a comprehensive conceptual framework for understanding education mismatch-how it's defined, how it's measured and how different research traditions explain it theoretically. Second, we're synthesizing what empirical evidence tells us about the relationship between education mismatch and various aspects of employee performance: Productivity, job satisfaction, organizational commitment and turnover intentions. Third, we're looking at contextual factors that might moderate these relationships, particularly public sector characteristics and contract-based employment arrangements. Fourth, we're identifying gaps in what we currently know and proposing directions for future research that can actually inform policy and practice in public sector human resource management-especially for systems like PPPK.

METHODOLOGY

This study uses a narrative literature review methodology. Given how conceptually complex our research topic is and how diverse the methodologies and theoretical perspectives are in education mismatch research, this approach makes sense. Narrative reviews work particularly well for topics that need meaningful synthesis of research evidence that's complex, broad and requires detailed, nuanced description and interpretation [24]. Unlike systematic reviews that stick to rigid protocols for finding and synthesizing literature [25], narrative reviews give us the flexibility to explore multiple perspectives, integrate diverse research traditions and provide interpretative analysis that acknowledges context-dependent factors [21,26].

We searched multiple databases: Web of Science, Scopus, JSTOR, ScienceDirect, SpringerLink, Taylor and Francis Online, Emerald Insight and Google Scholar. Our search terms combined different variations of education mismatch concepts with performance-related outcomes. Primary search strings mixed terms like "education mismatch," "overeducation," "undereducation," "qualification mismatch," "skill mismatch," "field-of-study mismatch," and "horizontal mismatch" with "employee performance," "productivity," "job satisfaction," "public sector," "civil service," "government employees," and "contract employees." We also ran specific searches focused on Indonesian public sector employment using terms including "PPPK," "Pegawai Pemerintah dengan Perjanjian Kerja," "Aparatur Sipil Negara" and "ASN performance."

The search prioritized peer-reviewed articles published between 2000 and 2025, though we included seminal earlier works when they provided foundational theoretical contributions. Think of works like Verdugo and Verdugo [9], Sicherman [12] and Tsang [13]. The review encompasses empirical studies using quantitative, qualitative and mixed methods, plus theoretical and conceptual papers that push our understanding of education mismatch forward. We included studies regardless of where they took place geographically, though we paid particular attention to research examining public sector employment and developing country contexts-since these are most relevant to understanding PPPK performance dynamics.

The literature synthesis followed thematic organization principles common in narrative reviews [21,22]. Rather than trying to cover every single available study exhaustively, the review selected studies that represent major theoretical perspectives, methodological approaches and empirical findings in the field. This selection strategy aligns with narrative review principles that emphasize conceptual contribution and interpretative depth over comprehensive enumeration. Our synthesis process involved identifying recurring themes, contrasting competing explanations, highlighting methodological innovations and noting contextual factors that moderate research findings.

It's important to acknowledge the inherent limitations of narrative literature reviews [27]. Unlike

systematic reviews, narrative approaches don't employ standardized protocols for literature selection and quality assessment. This potentially introduces selection bias. The interpretative nature of narrative synthesis also means that different reviewers might emphasize different aspects of the literature or reach somewhat different conclusions [23]. However, these limitations are offset by narrative reviews' strengths in accommodating diverse research traditions, providing contextual interpretation and offering flexibility to explore complex, multifaceted phenomena that resist narrow, predetermined frameworks [24]. For our topic, where education mismatch research spans multiple disciplines, employs diverse methodologies and produces context-dependent findings, the narrative approach provides an appropriate methodological framework for synthesis and interpretation.

Conceptual Foundations of Education Mismatch

Defining and Measuring Education Mismatch:

Education mismatch is a multidimensional phenomenon. It encompasses several distinct forms of misalignment between workers' educational qualifications and job requirements. The literature mainly distinguishes between vertical mismatch and horizontal mismatch, though these categories intersect in complex ways [3,28]. Vertical mismatch refers to situations where workers' educational levels differ from what's typically required for their occupations. Workers with more education than required? They're considered overeducated. Those with less education than typically needed? They're classified as undereducated [5]. Horizontal mismatch occurs when workers are employed outside their field of study, even when their educational level matches job requirements [6,29].

Measuring education mismatch presents methodological challenges that have generated substantial debate in the literature [4,30]. Three primary approaches have emerged. The normative or job analyst approach relies on expert assessments of educational requirements for different occupations. It often uses classification systems like the International Standard Classification of Occupations or ISCO [31]. This approach assumes that occupational requirements can be objectively determined and that these requirements remain relatively stable across contexts. The statistical approach defines mismatch based on deviations from the mean or modal educational level of workers within occupations. It typically considers workers more than one standard deviation above the mean as overeducated [9,32]. This approach adapts to actual labor market conditions, though it may confound genuine mismatch with upgrading of skill requirements or credentialism.

The subjective or self-assessment approach asks workers directly whether they consider themselves appropriately matched to their jobs [33,34]. This method captures workers' perceptions and experiences but it may be influenced by factors beyond objective skill requirements-things like job satisfaction, career expectations and social comparisons. Research

comparing these approaches reveals that they often yield different estimates of mismatch prevalence and may identify somewhat different populations of mismatched workers [5,35]. However, studies examining the relationship between mismatch and performance outcomes generally find qualitatively similar results across measurement approaches [36]. This suggests that the phenomenon itself is robust despite measurement variation.

Beyond the vertical-horizontal distinction, recent research has emphasized something important: we need to distinguish education mismatch from skill mismatch [11,37]. Education mismatch focuses on formal qualifications and credentials. Skill mismatch addresses whether workers' actual competencies align with job demands. An individual may be formally overeducated but effectively skill-matched if their job utilizes specialized competencies not reflected in educational credentials. Or conversely, they could be formally matched but overskilled if their capabilities exceed job demands [38]. This distinction has important implications for understanding performance effects, as skill mismatch may mediate or moderate the relationship between education mismatch and performance outcomes [39].

Theoretical Frameworks Explaining Education Mismatch

Multiple theoretical frameworks have been proposed to explain the existence, persistence and consequences of education mismatch. These frameworks offer competing and sometimes complementary perspectives on why mismatches occur and how they affect individual and organizational outcomes [3,35].

Human capital theory provides the foundational perspective [1,2]. It suggests that education enhances workers' productivity by developing cognitive skills, knowledge and work-related competencies. From this viewpoint, education mismatch represents market inefficiency arising from imperfect information, adjustment lags or institutional rigidities. Overeducation should be temporary as workers seek positions matching their qualifications or as employers upgrade job requirements to utilize available human capital. However, empirical evidence revealing persistent overeducation across cohorts and career stages has challenged this equilibrium assumption [5,12], prompting alternative theoretical explanations.

Job competition theory, articulated prominently by Thurow [40], takes a different view. It conceptualizes the labor market as a competition for positions within job hierarchies rather than a market for individual skills. Education serves primarily as a screening device signaling workers' trainability and reliability rather than directly enhancing productivity [41]. Employers rank candidates based on educational credentials and hire the most credentialed available workers, even for positions not requiring advanced education. This creates a cascade effect. Workers accept positions below their qualification levels when they can't secure positions matching their credentials, effectively displacing less-educated workers

into lower-tier positions [42]. From this perspective, education mismatch represents a persistent structural feature of labor markets characterized by positional competition rather than a temporary disequilibrium.

Assignment theory offers a third framework. It emphasizes the matching process between heterogeneous workers and jobs with varying skill requirements [43]. Workers differ not only in education levels but in multiple dimensions—ability, motivation and preferences. Similarly, jobs vary in skill requirements, working conditions, autonomy and compensation packages. Optimal matching requires aligning these multidimensional characteristics and mismatch arises when assignment mechanisms fail to achieve efficient matches [44]. This framework helps explain why some workers voluntarily accept positions below their qualification levels, trading lower credential utilization for other valued job characteristics such as flexibility, location or work environment [45].

Career mobility theory interprets overeducation as a stepping stone in career progression rather than a permanent condition [46]. Young workers may accept positions below their qualification levels to gain experience, develop professional networks or signal commitment to employers. They're anticipating future advancement to positions fully utilizing their credentials. From this perspective, observed overeducation at any given time represents a mix of temporary mismatches among workers in career transition and more problematic persistent mismatches among workers experiencing career stagnation. Empirical evidence on this hypothesis is mixed. Some studies find that initially overeducated workers eventually move to matched positions [47], while others document persistent overeducation across career stages [48,49].

More recent theoretical developments have emphasized the role of technological change and globalization in shaping education mismatch patterns [50,51]. Rapid technological advancement may create temporary skill shortages in emerging fields while rendering existing qualifications obsolete in declining sectors. This generates both undereducation and overeducation across different segments of the labor market. Globalization increases competitive pressures that may lead employers to upgrade credential requirements even for positions where actual task content remains relatively stable, contributing to credential inflation and overeducation [52].

Prevalence and Trends in Education Mismatch

Empirical studies examining education mismatch prevalence reveal substantial variation across countries, time periods and measurement approaches. But they consistently document that mismatch affects a significant proportion of workers [8,53]. Cross-country analyses using comparable methodologies suggest that overeducation rates typically range from twenty to forty percent of the workforce in developed economies. The rates are somewhat higher among recent graduates and lower among more experienced workers [8,54].

Undereducation appears less common, affecting approximately ten to twenty percent of workers, though this may reflect measurement challenges in identifying undereducated workers who successfully perform their jobs [53].

Horizontal mismatch or field-of-study mismatch, shows even higher prevalence in some studies—affecting between thirty and fifty percent of workers with tertiary education [6,29]. This suggests that many workers transition into fields different from their formal training, either by choice or necessity. The prevalence of horizontal mismatch varies substantially across fields of study. Graduates in more vocationally oriented programs like medicine, engineering and education show higher rates of field match. Those in general programs like humanities and social sciences experience higher rates of field mismatch [28,55].

Temporal trends in education mismatch remain debated. Some researchers argue that expansion of higher education without commensurate growth in graduate-level positions has increased overeducation over time. This phenomenon is sometimes termed credential inflation or educational upgrading [56,57]. Others contend that technological change and economic restructuring have upgraded skill requirements across occupations, absorbing the increased supply of educated workers without necessarily increasing mismatch rates [51]. Cohort analyses suggest that overeducation rates may have increased modestly over recent decades in many developed countries [20], though this trend isn't uniform across all contexts.

Public sector employment shows distinct patterns of education mismatch compared to private sector employment. Some studies find lower rates of education mismatch in public sectors. This potentially reflects more structured job classifications, stronger emphasis on formal credentials in hiring and less dynamic adjustments to changing skill demands [58]. However, other research documents higher rates of overeducation in public employment [55,59], particularly in contexts where government employment is perceived as offering security and benefits that compensate for lower credential utilization. These contradictory findings suggest that public sector mismatch patterns may vary substantially across countries and institutional contexts.

Education Mismatch and Employee Performance: Empirical Evidence

Productivity Effects of Education Mismatch: The relationship between education mismatch and worker productivity represents a central concern in this literature, with implications for both individual earnings and organizational efficiency. Theoretical predictions about productivity effects are ambiguous. On one hand, overeducated workers possess greater human capital than their matched counterparts doing the same job, potentially enabling superior performance. On the other hand, overeducation may generate frustration, reduced motivation and skill atrophy that undermine performance [13].

Empirical evidence on individual-level productivity effects comes primarily from wage studies. This makes sense given the difficulty of directly measuring worker productivity in most contexts. The dominant finding across numerous studies is that overeducated workers earn more than adequately educated workers in the same occupations but less than adequately educated workers in occupations matching their qualification levels [9,12,30]. This pattern, often termed the "overeducation wage penalty," suggests that overeducated workers are more productive than their matched colleagues in the same jobs but less productive than matched workers in positions requiring their qualification levels. The overeducation wage penalty typically ranges from ten to twenty-five percent, varying across countries, sectors and measurement approaches [34].

Studies examining firm-level productivity provide more direct evidence on organizational effects of education mismatch. Kampelmann and Rycx [14], using Belgian matched employer-employee panel data, found that overeducation is positively associated with firm productivity. Effects vary by technological intensity and workforce composition. Mahy *et al.* [60] confirmed these findings using a broader dataset with a longer time period from Belgium. They showed that the positive effect of overeducation on firm productivity is more pronounced in high-tech firms and knowledge-intensive activities. German studies examining establishment-level productivity reached mixed conclusions. Grunau [61] found negative effects of undereducation but insignificant effects of overeducation. Meanwhile, Büchel [62] documented that overqualified employees are healthier, more strongly work- and career-minded and more likely to participate in on-the-job training. Canadian research by Tsang and Levin [63] using province and industry level data found productivity increases of approximately three percent for each one percent increase in over education shares. The effects were larger in industries with greater intangible capital investment and more university-required jobs.

These seemingly contradictory findings may reflect heterogeneity in how organizations manage and deploy mismatched workers. Vermeylen and Warquier [64] found that firms that strategically hire overeducated workers and create systems to utilize their skills may realize productivity gains. In contrast, those viewing overeducation as unavoidable may experience the frustration and disengagement effects that reduce performance. The moderating role of organizational practices emerges as an important consideration. This includes training opportunities [65], job design flexibility and performance management systems.

Recent research has also emphasized the distinction between formal overeducation and genuine skill underutilization [11,38]. Workers may be formally overeducated based on credential requirements but effectively skill-matched if their jobs utilize specialized competencies developed through education. Conversely, workers may be formally matched but overskilled if their capabilities exceed actual job demands [39]. Studies

distinguishing between these forms of mismatch suggest that skill underutilization, particularly the combination of overeducation and overskilling, has more pronounced negative effects on productivity and other outcomes than overeducation alone [39].

Cross-country analyses examining aggregate effects of education mismatch on national productivity provide additional perspective. Research by McGowan and Andrews [66] using data from the OECD Survey of Adult Skills (PIAAC) across fifteen countries found that reducing mismatch results in increases in output per capita. This provides evidence for an important role of worker-job matching in aggregate economic outcomes. These findings suggest that education mismatch imposes costs not only on individuals and organizations but also on broader economic performance.

Job Satisfaction and Employee Engagement

The relationship between education mismatch and job satisfaction has received extensive empirical attention, with remarkably consistent findings across diverse contexts. The overwhelming weight of evidence indicates that overeducated workers experience lower job satisfaction than adequately matched workers. This relationship persists after controlling for wages, working conditions and individual characteristics [11,36,63]. The job satisfaction penalty associated with over education appears robust across different measurement approaches, countries and time periods [67,68].

The magnitude of the job satisfaction penalty varies across studies but typically represents a substantial effect. Research by Fleming and Koppelman [69] using large-scale survey data from multiple European countries found that overeducated workers report job satisfaction levels significantly below those of matched workers. The effects were comparable in magnitude to being unemployed for several months. Longitudinal studies by Korpi and Tählin [49] following individuals over time suggest that the job satisfaction penalty persists rather than diminishing as workers adapt to their situations. This contradicts expectations that workers adjust psychologically to stable circumstances.

Several mechanisms may explain the negative relationship between over education and job satisfaction. Expectancy-value theories suggest that overeducated workers experience frustration from unmet expectations and underutilization of capabilities they invested effort and resources to develop [70]. Social comparison processes may amplify dissatisfaction as overeducated workers compare themselves unfavorably to peers with similar credentials who secured matched positions [71]. The restricted opportunities for utilizing skills and knowledge developed through education may reduce intrinsic work motivation and engagement [72]. Additionally, overeducated workers may perceive their situations as unjust, violating equity principles that effort and investment should be appropriately rewarded [73].

Horizontal mismatch or field-of-study mismatch, also shows negative associations with job satisfaction, though effects are generally smaller than those for vertical

mismatch [6,29]. Workers employed outside their field of study report lower satisfaction than those working within their field, particularly when the mismatch is perceived as involuntary [53]. However, some research suggests that horizontal mismatch effects on satisfaction depend substantially on whether workers view their field transition as positive career exploration or as forced acceptance of suboptimal opportunities [11].

The relationship between under education and job satisfaction appears more complex. Some studies find that undereducated workers report satisfaction levels similar to matched workers or even slightly higher [9]. This potentially reflects exceeded expectations or gratitude for opportunities beyond their formal credentials. However, other research documents lower satisfaction among undereducated workers, particularly when they perceive themselves as lacking the skills or knowledge needed to perform their jobs effectively. This generates stress and anxiety [74].

Organizational Commitment and Turnover Intentions

Beyond job satisfaction, education mismatch affects other important attitudinal outcomes including organizational commitment and turnover intentions. Research consistently demonstrates that overeducated workers exhibit lower organizational commitment and higher turnover intentions than matched workers [11,75]. This pattern holds across diverse contexts and measurement approaches. Overeducated workers report reduced identification and involvement with their organizations [75,76]. This reduced commitment appears to flow partially through job satisfaction as a mediating mechanism [11] but also shows direct effects independent of satisfaction levels.

The relationship between education mismatch and turnover intentions has received substantial empirical attention given its practical implications for retention and organizational performance. Meta-analytic evidence by Verhaest and Omey [36] and multiple individual studies demonstrate that overeducated workers report higher intentions to leave their employers compared to matched workers. Moreover, longitudinal studies tracking actual turnover behavior confirm that overeducated workers exhibit higher rates of voluntary job separation [12,15]. This elevated turnover appears driven both by job dissatisfaction and by active search for positions better matching qualifications.

However, the education mismatch and turnover relationship shows important contingencies. Career mobility theory [46] suggests that overeducation may function as a stepping stone for some workers who accept initially mismatched positions while searching for better opportunities. Consistent with this perspective, research by Büchel and Mertens [47] finds that younger, more educated and more skilled workers are more likely to transition from overeducated to matched positions over time. In contrast, workers who remain overeducated across multiple years show declining mobility [48]. This suggests either adaptation to their situations, deterioration of skills through non-use or signaling of productivity problems that constrained their initial job matches.

The type of mismatch appears to matter for turnover outcomes. Studies by Mavromaras *et al.* [39] distinguishing between overeducation alone versus the combination of overeducation and overskilling find that skill underutilization shows stronger relationships with turnover intentions and behavior than formal overeducation. This suggests that perceived waste of capabilities matters more for retention than credential-job misalignment *per se*. Additionally, horizontal mismatch shows weaker relationships with turnover than vertical overeducation [6], particularly when field transitions result from positive career exploration rather than constrained opportunities.

Recent research has examined how organizational practices moderate education mismatch effects on commitment and turnover. The availability of on-the-job training opportunities appears particularly important. Studies by Wen *et al.* [15] find that training access reduces turnover propensity among overeducated workers. This may occur because training provides hope for career advancement, signals employer investment in the worker or creates transferable skills that improve external opportunities even if current positions remain mismatched. Performance-based compensation systems similarly appear to buffer against negative effects of overeducation on organizational commitment and turnover [77]. This potentially happens by providing alternative routes to recognition and reward beyond job title and position.

The public sector context shows distinct patterns regarding education mismatch and turnover. Several studies document weaker relationships between overeducation and turnover intentions in public sector employment compared to private sector positions [58,59]. This may reflect greater job security and benefits in public employment that compensate for credential underutilization. Or alternatively, it may indicate fewer external opportunities for overeducated public sector workers. The specific institutional features of different public sector systems, including opportunities for mobility across positions, recognition systems and career progression pathways, likely moderate these relationships in important ways.

Task Performance and Counterproductive Behaviors

Beyond self-reported satisfaction and intentions, researchers have begun examining how education mismatch affects objective work behaviors and performance. Studies examining relationships between education mismatch and supervisor-rated task performance yield mixed findings. Some research by Erdogan and Bauer [76] finds no significant relationship between overeducation and performance ratings, suggesting that overeducated workers perform adequately despite their dissatisfaction. Other studies by Tsang *et al.* [65] document small positive relationships, indicating that overeducated workers leverage their superior human capital to achieve slightly better performance than matched colleagues.

However, research examining more fine-grained performance dimensions reveals complexity in these relationships. Task performance, defined as fulfilling

prescribed job requirements and formal role expectations, may indeed show weak or null relationships with overeducation [76]. In contrast, contextual performance or organizational citizenship behaviors—which involve going beyond formal requirements to help others and contribute to organizational functioning—appear more sensitive to education mismatch. Several studies by Bolino and Feldman [78] find that overeducated workers engage in fewer citizenship behaviors. This potentially reflects reduced motivation to contribute beyond minimum requirements when they perceive their situations as undervaluing their capabilities.

Research examining counterproductive work behaviors provides additional insights. Industrial psychology literature suggests that workers experiencing frustration and perceived injustice may engage in withdrawal behaviors, such as absenteeism and reduced effort or more active counterproductive behaviors including interpersonal conflict and even sabotage [79]. While extreme counterproductive behaviors remain rare, studies by Johnson and O'Leary-Kelly [80] find modest positive relationships between overeducation and various forms of workplace withdrawal. Overeducated workers show slightly higher rates of absenteeism, greater likelihood of arriving late or leaving early and more frequent reports of reduced work effort compared to matched workers.

The psychological mechanisms linking education mismatch to reduced contextual performance and increased counterproductive behaviors appear to involve multiple pathways. Relative deprivation and inequity perceptions generate frustration and resentment that reduce willingness to contribute beyond minimum requirements [73,81]. Reduced intrinsic motivation flowing from underutilization of capabilities decreases engagement with work activities [72]. Lowered organizational commitment weakens identification with employer interests [82]. The combination of these factors creates conditions where overeducated workers may meet formal performance standards while withdrawing discretionary effort and citizenship contributions.

Recent research has emphasized the importance of examining heterogeneity in how overeducated workers respond to their situations. Not all overeducated workers exhibit reduced performance and engagement. Studies by Wrzesniewski and Dutton [83] identify proactive coping strategies including job crafting, where workers reshape their roles to create opportunities for skill utilization and psychological reframing, where workers reconstruct their situations in more positive terms. Workers who employ such strategies appear to maintain higher performance and engagement despite formal overeducation [84]. This suggests potential for organizational interventions supporting proactive coping among mismatched workers.

Education Mismatch in Public Sector Employment
Distinctive Characteristics of Public Sector Labor Markets: Public sector employment exhibits several distinctive characteristics that may influence both the prevalence of education mismatch and its consequences for employee performance. Understanding these unique

features is essential for interpreting research findings and developing appropriate policy responses, particularly for contract-based employment systems like PPPK.

First, public sector organizations typically place stronger emphasis on formal credentials in hiring and promotion decisions compared to private sector employers [16]. This reflects legal requirements, merit system principles and political accountability concerns that emphasize objective, verifiable qualifications. While this credential emphasis may reduce discrimination and favoritism, it may also contribute to credentialism where formal education requirements exceed actual job demands [42]. Research examining public-private sector differences in education mismatch yields mixed findings. Some studies by Wolbers [55] document higher rates of overeducation in public employment. Others by Bender and Heywood [58] find lower rates. This suggests substantial variation across countries and institutional contexts.

Second, public sector wage structures typically exhibit greater compression than private sector compensation. There are smaller pay differentials across positions and less flexibility to reward individual performance [85,86]. This compressed wage structure may attract overeducated workers seeking security and benefits even if wages are lower than they could command in matched private sector positions. Conversely, compressed wages may reduce incentives for workers to seek additional education, potentially lowering undereducation rates. The implications for performance depend on whether overeducated public sector workers view their situations as acceptable trades of credential utilization for security and benefits or whether they experience the same frustration and reduced motivation documented in private sector contexts.

Third, public sector employment often provides greater job security than private sector positions, particularly for permanent civil servants [87]. This security may buffer against some negative consequences of education mismatch by reducing anxiety about job loss and providing stability that workers value. However, reduced turnover may also mean that mismatches persist longer in public employment, potentially exacerbating frustration and skill atrophy over time [49]. The implications of job security for education mismatch effects likely depend on whether workers entered public employment voluntarily accepting trade-offs or whether they feel trapped in mismatched positions.

Fourth, public sector organizations often have more rigid job classifications and less flexibility in job design compared to private sector firms [88]. This rigidity may limit opportunities for overeducated workers to reshape their roles to utilize their capabilities, potentially intensifying underutilization and its negative consequences. However, some public sector contexts provide opportunities for lateral mobility across positions that may help workers find better matches without leaving their employers. The extent to which organizational structures facilitate or constrain matching within public employment likely varies substantially across institutional contexts.

Fifth, public sector work is often characterized by distinct motivational profiles. Research on public service motivation by Perry and Wise [19] suggests that many public sector workers are drawn by intrinsic motivation to serve the public interest rather than purely by extrinsic rewards. This motivation profile may moderate education mismatch effects. Intrinsically motivated workers might be less affected by credential underutilization if they find meaning in their work. However, overeducation may alternatively undermine intrinsic motivation if workers feel unable to make the contributions they're capable of providing [89].

Empirical Evidence on Education Mismatch in Public Sector Contexts

Research specifically examining education mismatch in public sector employment remains more limited than private sector research but several important findings have emerged. A study by Di Stasio [90] using Italian data examined how corruption affects workforce selection and allocation in the public sector. The study found that areas with higher corruption showed weaker relationships between educational attainment and likelihood of public sector employment and higher rates of educational mismatch within public employment. This suggests that politicization and patronage can distort matching processes in public sectors, with implications for performance and service delivery quality.

Research comparing education mismatch effects across sectors has yielded nuanced findings. A recent study by Bender and Heywood [58] examining overeducation and job satisfaction in public versus private sector employment found that while overeducation reduces satisfaction in both sectors, the satisfaction penalty is smaller in public sector employment. This may reflect compensating factors such as job security, benefits and public service motivation that offset some negative effects of credential underutilization. However, the study also found that public sector workers experience less wage premium for their overeducation compared to private sector workers. This suggests reduced economic returns to excess credentials in public employment.

Studies examining horizontal mismatch in public versus private sectors generally find higher rates of field match in public employment. This is particularly true in sectors like education and healthcare where public employment is concentrated in occupations with clear professional credentials [55]. This suggests that public sector hiring may more effectively match workers' fields of training to job requirements, at least for professionally oriented positions. However, for administrative and support positions, field matching may be looser. This potentially reflects broader applicability of general skills in government work.

Research on education mismatch and turnover in public sector contexts reveals interesting patterns. Several studies by Di Pietro and Urwin [59] document weaker relationships between overeducation and turnover intentions in public versus private employment.

This suggests that job security and benefits may indeed compensate for credential underutilization in workers' calculations about whether to seek alternative positions. However, other research finds that overeducated public sector workers show high intentions to move to better-matched positions within government even when they don't intend to leave public employment entirely. This highlights the importance of internal labor market dynamics.

The limited research examining education mismatch effects on performance in public sector contexts suggests patterns broadly similar to those in private employment. Overeducation is associated with reduced job satisfaction, organizational commitment and citizenship behaviors. However, one study by Maynard *et al.* [75] found that public sector organizational practices including opportunities for skill development and inclusive decision-making processes substantially moderate these relationships. They reduce negative effects of overeducation when present. This suggests that human resource management strategies may be particularly important for managing education mismatch effects in public organizations.

Implications for Contract-Based Public Employment Systems

Contract-based public sector employment systems like Indonesia's PPPK combine elements of traditional public employment with features more commonly associated with private sector or temporary work arrangements. Understanding how education mismatch affects performance in such systems requires considering how these hybrid characteristics influence both the likelihood of mismatch and its consequences.

Contract employees typically face more precarious employment conditions than permanent civil servants. They lack the job security that might buffer against some negative effects of education mismatch. At the same time, contract systems often incorporate performance-based evaluation mechanisms that more directly link performance to employment outcomes through contract renewal decisions [17]. This performance orientation may amplify the practical significance of education mismatch effects on performance, as reduced job satisfaction, organizational commitment or citizenship behaviors could more directly influence employment security and career prospects.

The temporary or fixed-term nature of contract positions may also influence how workers perceive and respond to education mismatch. Some research suggests that workers may be more willing to accept mismatch in temporary positions if they view them as stepping stones to better opportunities. This aligns with career mobility theory [46]. This may reduce immediate dissatisfaction if workers view their situations as temporary. On the other hand, uncertainty about contract renewal and limited pathways to permanency may exacerbate frustration among overeducated contract workers who feel their qualifications should provide better opportunities. The career implications of contract employment likely depend

substantially on whether such positions offer realistic pathways to permanent employment or represent dead-end positions.

The integration of contract employees within broader organizational contexts presents additional challenges. If contract workers performing similar tasks to permanent employees receive lower pay or fewer benefits, this may intensify perceived inequity [73]. This is particularly true for overeducated contract workers who may already feel undercompensated for their credentials. Organizational practices that emphasize status distinctions between contract and permanent employees may similarly amplify negative effects of education mismatch by adding employment status concerns to credential underutilization frustrations.

However, contract employment also offers potential advantages for managing education mismatch effects. The flexibility to not renew contracts of poorly performing workers may allow organizations to address severe mismatch situations more readily than permanent systems where dismissal is difficult. The emphasis on performance evaluation provides opportunities to identify and develop overeducated workers whose performance suggests capability for advancement. The use of contract positions for specialized roles may reduce horizontal mismatch by enabling targeted recruitment of workers with specific field training.

For contract-based systems like PPPK, research on education mismatch suggests several implications. First, recruitment processes should attend not only to minimum qualification requirements but to probable career trajectories and opportunities for credential utilization. This helps avoid creating situations where qualified workers are systematically channeled into positions below their preparation levels. Second, performance management systems should be designed to recognize and reward superior performance by overeducated workers who leverage their human capital effectively. This provides pathways for advancement to positions utilizing their full capabilities. Third, training and development opportunities should be provided to help contract workers develop competencies beyond formal credentials, potentially reducing skill mismatch even where education mismatch exists [15]. Fourth, organizational practices should minimize perceived inequities between contract and permanent workers performing similar tasks, to avoid amplifying frustration associated with education mismatch.

DISCUSSION AND FUTURE RESEARCH DIRECTIONS

Synthesis of Key Findings

This narrative literature review has synthesized extensive research on education mismatch and its implications for employee performance, with attention to contexts relevant for contract-based public sector employment like PPPK. Several overarching conclusions emerge from this synthesis that carry implications for theory, policy and practice.

First, education mismatch represents a widespread and persistent phenomenon affecting substantial

proportions of workers across diverse contexts [20,53]. Rather than a temporary disequilibrium that labor market mechanisms quickly resolve, education mismatch appears to be a structural feature of contemporary labor markets. It arises from multiple sources including credential inflation [56], imperfect information [41], institutional rigidities [40] and technological change [51]. The prevalence and persistence of mismatch suggests that addressing it requires systemic interventions rather than expecting individual-level adjustments to fully resolve the problem.

Second, education mismatch carries significant consequences for multiple dimensions of employee performance and wellbeing. The evidence overwhelmingly demonstrates that overeducation is associated with reduced job satisfaction [11,36], lower organizational commitment [76], higher turnover intentions [12,15] and decreased engagement in citizenship behaviors [78]. While effects on formal task performance appear more modest [84], the broader pattern suggests that education mismatch undermines worker wellbeing and reduces discretionary contributions to organizational effectiveness. These effects appear to persist rather than diminishing as workers adapt to mismatched situations [49], indicating lasting rather than transitory impacts.

Third, the mechanisms linking education mismatch to performance outcomes appear to be primarily motivational and attitudinal rather than purely capability-based. Overeducated workers possess the human capital to perform effectively and typically do meet formal performance standards [62]. But reduced satisfaction, perceived inequity [73] and frustrated expectations undermine motivation to contribute beyond minimum requirements. This suggests that interventions targeting worker attitudes and organizational contexts may effectively mitigate education mismatch effects even when changing the mismatch itself is difficult.

Fourth, substantial heterogeneity characterizes education mismatch effects, with outcomes varying across individuals, contexts and organizational practices. Not all overeducated workers experience severe negative consequences [76]. Some successfully leverage their credentials to achieve superior performance and eventual upward mobility [12]. Contextual factors including organizational culture, human resource practices [60], job characteristics [76] and sector differences [87] moderate education mismatch effects in important ways. This heterogeneity suggests both challenges and opportunities for managing education mismatch in practice.

Fifth, the public sector context exhibits distinctive features that shape both the prevalence and consequences of education mismatch. Greater emphasis on formal credentials [16], compressed wage structures [85], enhanced job security [87] and stronger public service motivation [88] distinguish public from private employment in ways that may amplify some education mismatch effects while buffering others. Understanding these sector-specific dynamics is essential for developing appropriate policy responses, particularly

for hybrid employment forms like PPPK that combine public and private sector characteristics.

Theoretical Implications

The accumulated research on education mismatch and performance holds several implications for theoretical development. The persistent negative effects of overeducation on job satisfaction and engagement [11,36] provide support for expectancy-value theories [70] and equity theories [73] emphasizing unmet expectations and perceived injustice as sources of dissatisfaction. However, the modest effects on formal task performance [76] and the heterogeneity in outcomes suggest that more nuanced theoretical models are needed to explain when and why education mismatch undermines performance.

An emerging theoretical perspective might integrate insights from multiple frameworks to develop a more comprehensive account. Such a model would recognize that education mismatch affects workers through multiple pathways including economic consequences (wage penalties), psychological consequences (frustration, reduced intrinsic motivation) and social consequences (status concerns, social comparisons). The relative salience of these pathways likely varies across individuals based on factors including career stage, alternative opportunities, personal values and coping strategies [76]. Moreover, organizational and institutional contexts moderate these individual-level processes in important ways [60].

Person-environment fit theories [91] provide a useful overarching framework for integrating these insights. They conceptualize education mismatch as a specific form of person-job misfit. From this perspective, education mismatch represents poor correspondence between worker characteristics (credentials, skills, expectations) and job characteristics (requirements, opportunities, rewards). Poor fit generates strain through multiple mechanisms and individuals employ various coping strategies with differential effectiveness for maintaining performance and wellbeing [83]. Organizations can intervene through improving initial selection, providing opportunities for better fit over time through career development or modifying job characteristics to better accommodate worker attributes.

The application of these theoretical frameworks to public sector contexts requires extensions that account for distinctive institutional features. The relative importance of different motivational drivers likely differs in public versus private employment. Public service motivation [88] potentially buffers some education mismatch effects. The institutional constraints on human resource flexibility in public organizations may limit some coping strategies while enabling others. Theoretical models of education mismatch effects in public sector contexts should explicitly incorporate these sector-specific considerations.

Research Gaps and Future Directions

Despite substantial research on education mismatch, important gaps remain that future research should

address. First, limited research has directly examined education mismatch in contract-based public sector employment systems. Given the growth of such employment arrangements globally and their distinct characteristics combining elements of public and private employment [92], focused research on education mismatch prevalence, determinants and consequences in contract employment contexts is needed. Comparative research examining differences between contract and permanent employees within public sectors would be particularly valuable.

Second, most research on education mismatch and performance has relied on self-reported measures of satisfaction, intentions and sometimes self-rated performance. While these measures are valuable, more research is needed using objective performance indicators including supervisor ratings, productivity metrics and organizational outcomes. Longitudinal studies tracking individuals over time can better establish causal relationships and examine performance trajectories associated with education mismatch [49]. Experimental or quasi-experimental designs that leverage policy changes or organizational interventions would strengthen causal inference.

Third, research should give greater attention to the heterogeneity in education mismatch effects and the factors explaining why some workers appear resilient to negative consequences while others experience severe impacts. Individual differences in coping strategies [83], career orientations, alternative opportunities and psychological resources likely moderate education mismatch effects. Identifying protective factors could inform interventions to help mismatched workers maintain performance and wellbeing.

Fourth, more research is needed on organizational practices that effectively manage education mismatch effects. While some studies have examined training opportunities [15] and performance-based compensation [77] as moderators, systematic research on broader human resource management practices including job design, career development systems and employee voice mechanisms would advance understanding of how organizations can mitigate education mismatch costs. Implementation studies examining specific interventions would be particularly valuable for translating research into practice.

Fifth, research on horizontal mismatch or field-of-study mismatch lags behind research on vertical mismatch, despite evidence that horizontal mismatch is at least as prevalent and may carry important performance implications [6,29]. More research is needed distinguishing between voluntary field transitions reflecting positive career exploration versus involuntary field mismatch reflecting labor market constraints. These likely have very different implications for performance and wellbeing.

Sixth, research should extend beyond individual-level outcomes to examine how aggregate patterns of education mismatch affect organizational and societal outcomes. Few studies have examined whether

organizations with higher proportions of mismatched workers experience different organizational performance outcomes [14] and how this depends on how organizations manage their mismatched workers. At the societal level, more research is needed on how education mismatch affects aggregate productivity, innovation and economic growth [66], particularly in developing country contexts where human capital development is a central policy priority.

Finally, research on education mismatch should give greater attention to developing country contexts and non-Western institutional settings. Most existing research comes from developed Western countries with established labor market institutions. Whether findings generalize to contexts with different educational systems, labor market structures and cultural contexts remains unclear. Research specifically examining education mismatch in contexts like Indonesia's PPPK system would contribute both to theoretical understanding and to practical policy development for emerging public sector reforms.

CONCLUSION

Education mismatch represents a significant challenge in contemporary labor markets with important implications for individual workers, organizational performance and societal welfare. This narrative literature review has synthesized extensive research demonstrating that education mismatch, particularly overeducation, affects substantial proportions of workers [8] and carries meaningful consequences for multiple dimensions of employee performance and wellbeing. While overeducated workers typically possess sufficient human capital to meet formal performance standards [62], reduced satisfaction [11], organizational commitment [76] and discretionary effort [78] suggest that education mismatch undermines fuller contributions to organizational effectiveness.

The public sector context exhibits distinctive features that shape education mismatch dynamics in important ways [87,88]. Contract-based public sector employment systems like Indonesia's PPPK combine elements of public and private employment models in ways that may both amplify and buffer education mismatch effects [17]. Understanding these dynamics is essential for designing human resource management practices that effectively support contract employee performance while managing costs associated with credential-job mismatches.

Several practical implications emerge from this review for managing education mismatch in contract-based public sector employment. Recruitment processes should attend to realistic opportunities for credential utilization and career progression, avoiding systematic channeling of qualified workers into positions substantially below their preparation levels. Performance management systems should recognize and reward superior performance by overeducated workers, providing pathways for advancement to positions fully utilizing their capabilities [77]. Training and development opportunities should be provided to address skill gaps and support career progression [15]. Organizational practices should minimize perceived inequities [73] and

create opportunities for meaningful contribution and skill utilization.

However, addressing education mismatch ultimately requires attention not only to organizational practices but to broader labor market dynamics and educational policies. Coordination between educational systems and labor market demands can help reduce systematic mismatches, though the inherent uncertainties in forecasting future skill needs and the lag between educational investment and labor market entry limit the extent to which such coordination can fully resolve mismatch problems [51]. Individual career guidance and labor market information can help prospective workers make more informed educational and career decisions, though information alone cannot overcome structural constraints in labor markets.

Education mismatch represents a complex phenomenon arising from multiple sources and carrying multifaceted consequences. While complete elimination of mismatch may be neither feasible nor necessarily optimal given the benefits of educational flexibility and diverse career pathways, better understanding and management of education mismatch can improve outcomes for workers, organizations and societies. For contract-based public sector employment systems navigating between flexibility and stability, effectiveness and efficiency, attention to education mismatch dynamics represents an important component of human resource management and civil service reform.

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