
A Survey of Vocational Education Systems in Germany and Spain: Comparative Analysis and International Policy Implications

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Abstract

This survey paper provides a comparative analysis of vocational education systems in Germany and Spain, with a focus on their alignment with labor market needs and workforce development. Germany's dual vocational education system is highlighted for its effective integration of theoretical and practical training, facilitating smooth transitions from education to employment and maintaining low youth unemployment rates. In contrast, Spain's recent reforms, particularly the implementation of dual vocational education and training (dual VET), aim to enhance the alignment of vocational training with industry demands, though challenges in employer engagement and curriculum adaptation persist. The study underscores the importance of developing transversal competences, such as problem-solving and adaptability, to enhance long-term employability in a dynamic labor market. Institutional support and public investment are identified as critical factors for economic resilience and the effectiveness of vocational education systems. The paper concludes by suggesting areas for future research, including the development of comprehensive support systems for small and medium-sized enterprises (SMEs) and the examination of public policies' impact on vocational education participation. This analysis offers insights into the implications for international education policy and the need for adaptable training models that support lifelong learning and economic growth.

1 Introduction

1.1 Overview of Vocational Education Systems

Vocational education systems are essential for equipping individuals with skills that meet the demands of contemporary labor markets. These systems deliver both practical and theoretical knowledge closely aligned with industry requirements, enhancing workforce readiness and employability. A hallmark of effective vocational education is its integration with national economic structures. For example, Germany's dual vocational education system uniquely combines classroom instruction with hands-on training in small and medium-sized enterprises (SMEs), facilitating skill acquisition while bolstering SMEs' roles in economic development [1].

Conversely, countries like Spain are reforming their vocational education systems to better align with labor market needs and strengthen institutional support for adult learning. The political economy of adult learning systems (ALS) underscores the significance of institutional features that foster continuous learning and adaptability to economic shifts [2]. This survey examines the vocational education systems in Germany and Spain to identify key components contributing to their effectiveness and explore adaptations necessary for meeting international labor market demands.

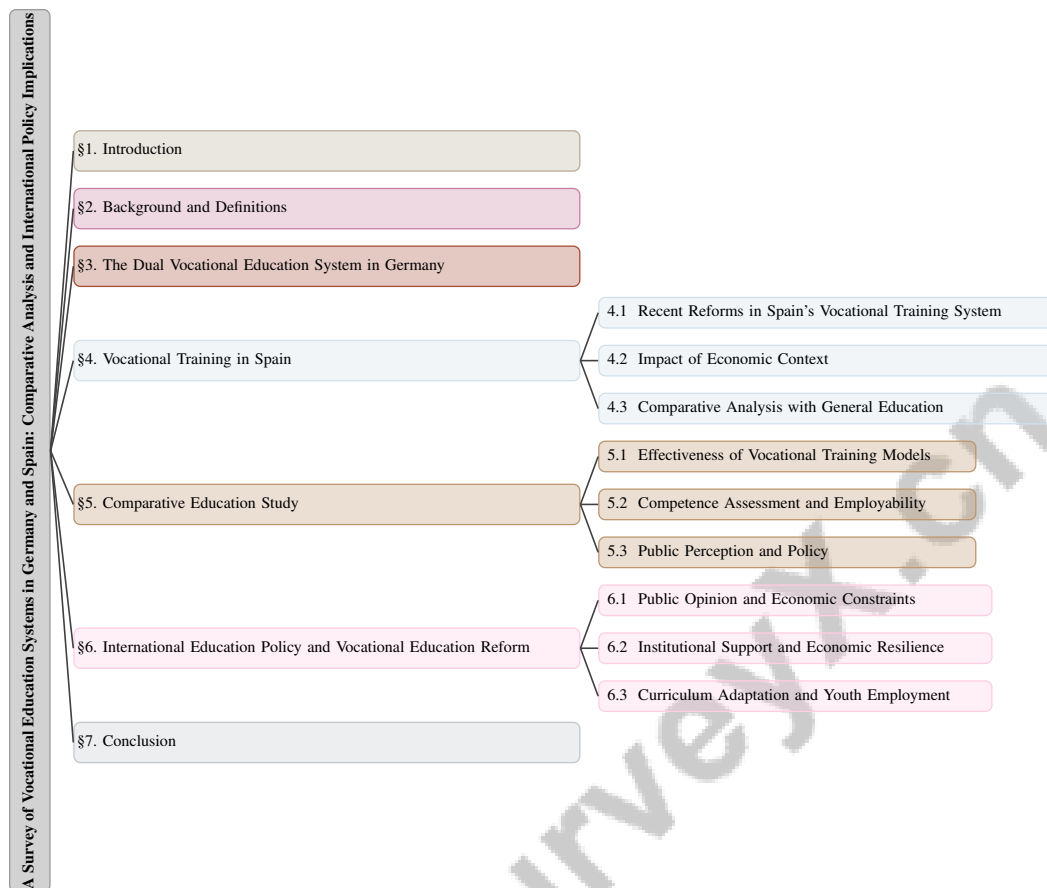


Figure 1: chapter structure

1.2 Significance in Labor Market Needs

Vocational education is crucial in addressing labor market demands by equipping individuals with industry-relevant skills. Aligning educational programs with labor market requirements facilitates smoother transitions from education to employment, thereby enhancing workforce readiness and employability. The growing emphasis on vocational education and apprenticeships has been linked to improved youth employment outcomes, equipping students with skills necessary for rapidly evolving job markets. Research indicates that effective vocational training integration can enhance job security and reduce job turnover among young workers, benefiting both individuals and local economies. Collaboration among policymakers, educators, and industry stakeholders is vital to ensure vocational education evolves with labor market demands and cultivates transversal competences essential for long-term career success [3, 4, 5, 6]. Empirical studies reveal that vocational education may provide distinct early career advantages, although these benefits can diminish over time.

Integrating and assessing transversal competences within Vocational Education and Training (VET) curricula is critical for enhancing employability in a dynamic labor market [3]. These competences, including problem-solving and adaptability, are increasingly valued by employers, contributing to innovation and economic growth, particularly within SMEs [1]. Public opinion research indicates a strong preference for increased investment in education, reflecting societal recognition of vocational education's role in fostering economic resilience [7]. The prolonged and precarious transition from school to work, exacerbated by economic downturns like the Great Recession, highlights the necessity for effective vocational education systems that can adapt to changing economic conditions and support youth employment [4].

Moreover, challenges faced by employers in engaging with apprenticeship programs across various international contexts underscore the need for supportive policies and institutional frameworks that facilitate the integration of vocational training into the broader economic landscape [6]. Addressing

these challenges allows vocational education to significantly contribute to workforce development and economic growth.

1.3 Enhancing Workforce Skills

Vocational education plays a vital role in enhancing workforce skills through targeted training that aligns with industry-specific demands, facilitating smoother transitions from school to work and providing immediate earnings benefits [8]. Integrating vocational education within the broader educational landscape is essential for equipping students with both technical skills and transversal competences, such as problem-solving and adaptability, which are critical for employability in a rapidly changing labor market [3].

Empirical research highlights the importance of vocational education in fostering workforce readiness, particularly regarding immediate advantages in early career stages. However, it also points to potential limitations, as the initial benefits of vocational training may not translate into long-term adaptability, necessitating balanced educational policies that support lifelong learning and skill diversification [5].

Strong public support for education spending, evidenced by surveys, reflects societal acknowledgment of the importance of investing in vocational education for enhancing workforce skills and economic resilience [7]. Institutional frameworks significantly shape the effectiveness of vocational education systems, influencing the stability and success of school-to-work transitions and contributing to lower youth unemployment rates [4]. By addressing these factors, vocational education can effectively contribute to workforce development, ensuring individuals are well-prepared to meet evolving labor market demands.

1.4 Structure of the Survey

This survey is systematically structured to provide a comprehensive analysis of vocational education systems in Germany and Spain, focusing on comparative aspects and international policy implications. The paper begins with an **Introduction**, contextualizing the significance of vocational education in aligning with labor market needs and enhancing workforce skills. This section includes an overview of vocational education systems, emphasizing Germany's dual vocational system and Spain's ongoing reforms.

Following the introduction, the **Background and Definitions** section explores Germany's dual vocational education system and Spain's vocational training system. Key terms such as 'dual vocational education', 'vocational training', and 'vocational education reform' are defined to establish a common understanding for subsequent discussions.

The third section, **The Dual Vocational Education System in Germany**, delves into the structure, implementation, and outcomes of Germany's model, assessing its effectiveness in aligning education with labor market demands and its role in workforce development. This section also addresses employer engagement and challenges within the system.

The fourth section, **Vocational Training in Spain**, examines Spain's vocational training system, highlighting recent reforms and challenges while providing a comparative analysis with the German model, focusing on policy implementation and outcomes.

The **Comparative Education Study** section conducts a detailed comparative analysis of the vocational education systems in Germany and Spain, identifying similarities and differences in their approaches to vocational training and education reform, evaluating the effectiveness of vocational training models, and assessing competence and employability.

The penultimate section, **International Education Policy and Vocational Education Reform**, explores international education policies related to vocational education, discussing how various countries adapt their systems to meet global labor market needs and enhance workforce skills, considering factors such as public opinion, economic constraints, institutional support, and curriculum adaptation.

The survey concludes with a **Conclusion** section that summarizes key findings and reflects on implications for international education policy and vocational education reform, suggesting areas for future research and providing a comprehensive overview of the topic's broader significance. The following sections are organized as shown in Figure 1.

2 Background and Definitions

2.1 Overview of Dual Vocational Education in Germany

Germany's dual vocational education system is integral to its workforce development, blending theoretical education with practical training to align with labor market demands. Originating during the 19th-century industrialization, it has evolved to meet the challenges of technological advancements and globalization. The Vocational Education and Training (VET) programs focus on integrating transversal competences—crucial for employability—while fostering collaboration among policy-makers, industry stakeholders, and educators to enhance learning experiences. As socio-economic changes reshape VET perceptions, further empirical research is needed to assess these competences across various contexts [4, 1, 3].

A key feature of Germany's dual system is the partnership between educational institutions and SMEs, ensuring curricula align with industry needs, fostering innovation, and enhancing employability [1]. Students alternate between classroom instruction and company-based training, applying academic skills practically.

Public opinion surveys reflect high regard for vocational education, especially in Germany, where it is seen as vital for economic resilience [7]. The system's effectiveness is evidenced by low youth unemployment rates and smooth education-to-employment transitions, even during economic downturns like the Great Recession [4].

2.2 Vocational Training System in Spain

Spain's vocational training system has transformed significantly to align with labor market needs, transitioning from a centralized, theory-focused structure to a dual-oriented system similar to Germany's [9]. A survey of dual VET across 456 educational centers in Spain highlights the organizational and curricular changes [10]. These reforms allow for curriculum flexibility, enabling institutions to tailor programs to regional economic and industry demands, crucial in a country with diverse economic landscapes.

Challenges persist, particularly in employer engagement and workforce integration. Reforms have largely focused on educational institutions, often overlooking the perspectives of students and employers, which are critical for a comprehensive understanding of the system's effectiveness [10]. Addressing these gaps is essential for fostering stronger partnerships between educational centers and industries, enhancing graduates' employability.

2.3 Defining Key Concepts

Clear definitions of key concepts are crucial for analyzing vocational education systems. 'Dual vocational education' refers to a structured approach combining classroom learning with practical workplace training, as seen in Germany's system, ensuring learners acquire both theoretical knowledge and hands-on experience, aligning education with labor market needs [1].

'Vocational training' includes educational programs designed to equip individuals with specific skills for particular occupations, adapted to evolving labor market needs, as demonstrated by Spain's reforms [9]. Its effectiveness is measured by immediate skill acquisition and the development of 'transversal competences'—such as problem-solving and adaptability—essential for long-term employability [3].

'Vocational education reform' involves systematic updates to vocational education systems to align with current and future labor market needs, revising curricula, enhancing employer engagement, and integrating innovative training methodologies. Reforms aim to balance vocational and general education benefits, impacting employment rates over the life cycle [5].

Understanding these concepts is vital for analyzing vocational education systems' challenges and opportunities, particularly concerning labor market integration and skilled workforce development. This analysis is increasingly relevant given the changing dynamics of youth employment, the importance of transversal competences, and the need for collaboration among policymakers, industry stakeholders, and educators to enhance adaptability and career prospects [8, 5, 3].

In examining the complexities of vocational education systems, particularly in Germany, it is essential to consider the structural elements that facilitate effective training and collaboration. Figure 2 illustrates the hierarchical structure of Germany's dual vocational education system, highlighting its collaborative framework, the role of small and medium-sized enterprises (SMEs), and the regulatory aspects involved in both structure and implementation. This figure further outlines the short-term and long-term outcomes of the system, emphasizing the critical importance of employer engagement and the associated challenges that arise within this context. By integrating these visual elements, we gain a clearer understanding of how these components interact to shape the educational landscape, ultimately informing best practices in vocational training.

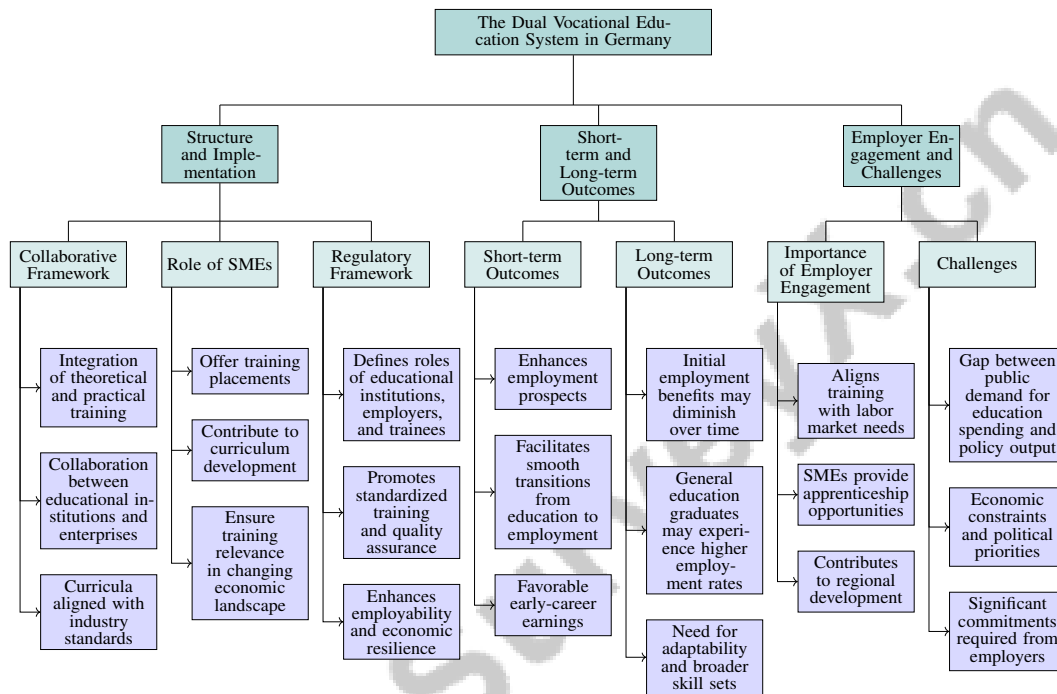


Figure 2: This figure illustrates the hierarchical structure of Germany's dual vocational education system, highlighting its collaborative framework, the role of SMEs, and regulatory aspects in structure and implementation. It also outlines short-term and long-term outcomes, emphasizing the importance of employer engagement and associated challenges.

3 The Dual Vocational Education System in Germany

3.1 Structure and Implementation

Germany's dual vocational education system effectively bridges the gap between education and labor market requirements by integrating theoretical and practical training. This system relies on a collaborative framework involving educational institutions and enterprises to develop curricula that align with industry standards [9]. Students alternate between classroom instruction and practical on-the-job training, facilitating the immediate application of theoretical knowledge.

As illustrated in Figure 3, the structure of Germany's dual vocational education system emphasizes this collaborative framework, highlighting the pivotal role of small and medium-sized enterprises (SMEs) in providing training placements and contributing to curriculum development. This collaboration ensures that training remains relevant in a changing economic landscape [6]. A structured framework for employer engagement further aligns training with industry needs, equipping graduates with essential skills for workforce integration.

A comprehensive regulatory framework defines the roles of educational institutions, employers, and trainees, promoting standardized training across sectors and ensuring quality assurance. Germany's dual system exemplifies effective workforce development through strong educational and labor market

partnerships, enhancing employability and contributing to low youth unemployment and economic resilience. By combining practical training with academic learning, the system prepares students to adapt to evolving job demands, addressing challenges posed by technological advancements and ensuring long-term employment stability [10, 4, 5].

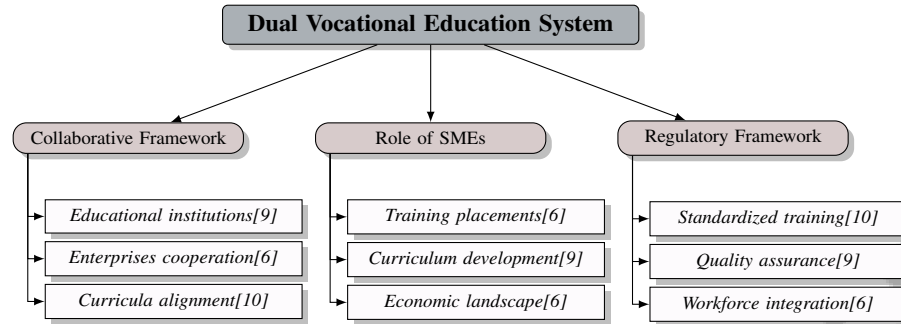


Figure 3: This figure illustrates the structure of Germany’s dual vocational education system, highlighting the collaborative framework involving educational institutions and enterprises, the pivotal role of SMEs in training and curriculum development, and the comprehensive regulatory framework ensuring standardized training and quality assurance.

3.2 Short-term and Long-term Outcomes

Germany’s dual vocational education system produces distinct outcomes over different time frames. In the short term, it enhances employment prospects by equipping individuals with industry-relevant skills, facilitating smooth transitions from education to employment and favorable early-career earnings [8].

However, long-term outcomes are more nuanced. Although initial employment benefits are evident, research indicates these advantages may diminish over time. As individuals age, those with general education often experience higher employment rates than vocational education graduates [5]. This trend suggests that the adaptability and broader skill sets associated with general education may provide advantages in a dynamic labor market, where transversal competencies like problem-solving and adaptability are increasingly crucial [3].

While dual VET programs enhance short-term employability through industry-specific skills, they may not adequately prepare individuals for diverse future employment demands, particularly amidst rapid technological advancements [5, 8, 10, 3]. Addressing these challenges is essential to improve the system’s effectiveness in preparing individuals for a dynamic labor market, ensuring sustained employment and career growth.

3.3 Employer Engagement and Challenges

Employer engagement is critical to the success of Germany’s dual vocational education system, ensuring training aligns with labor market needs. The active involvement of employers, particularly SMEs, is vital as they provide apprenticeship opportunities that enhance youth employability and contribute to regional development by ensuring a skilled workforce [2, 6, 1, 3]. SMEs offer essential practical training, complementing classroom education and facilitating seamless transitions from education to employment.

However, the system faces challenges, primarily due to the gap between public demand for increased education spending and actual policy output. Economic constraints and political priorities often limit the system’s adaptability to changing labor market needs [7]. The economic environment influences employers’ capacity to engage with vocational training programs, as financial and resource limitations can affect their willingness to participate.

Moreover, the dual system requires significant commitments from employers, who must invest time and resources into training apprentices effectively. This poses challenges for SMEs, especially in developing countries, where infrastructure, skilled personnel, and long-term financing may be lacking

[6, 1]. Addressing these challenges requires supportive policies and institutional frameworks that incentivize employer participation and provide necessary resources for effective training partnerships.

Enhancing employer engagement through targeted policy measures and addressing economic constraints will enable Germany's dual vocational education system to remain robust. This approach will ensure the consistent delivery of high-quality training that meets the evolving needs of students and employers, fostering a skilled workforce adaptable to dynamic labor market requirements [6, 10, 9, 5, 3].

4 Vocational Training in Spain

4.1 Recent Reforms in Spain's Vocational Training System

Spain's vocational training system has been reformed significantly to enhance educational quality and relevance in line with labor market demands. Central to these reforms is the expansion of dual vocational education and training (dual VET), which combines classroom learning with practical workplace experience, drawing inspiration from successful models like Germany's [9]. This approach aims to equip students with career-applicable skills, although comparisons suggest no substantial effectiveness differences between dual VET and traditional work experience modules, indicating the need for further refinement [10].

Employer engagement remains a challenge. Lessons from Malaysian apprenticeship programs highlight systemic issues that require collaborative stakeholder efforts to create a supportive vocational training framework [6]. In Spain, similar collaboration is essential to overcome employer participation barriers, thereby strengthening educational and industry partnerships.

4.2 Impact of Economic Context

Spain's vocational training system is heavily influenced by the economic context, impacting both educational demand and responsiveness to labor market needs. Economic fluctuations, such as those experienced during the Great Recession, underscore the need for adaptable vocational systems to support youth employment [4]. Historically, economic conditions have shaped vocational training structures, prompting reforms to enhance flexibility and relevance.

High youth unemployment rates, exacerbated by economic downturns, have driven reforms to align vocational education with labor market demands. The integration of dual VET is a key reform aimed at providing students with practical workforce-relevant skills [9]. However, the success of these reforms depends on effective employer engagement and the system's adaptability to economic changes.

Economic constraints also limit public investment in education, affecting resources available for vocational training. Public opinion favors increased educational spending, reflecting societal recognition of education's role in fostering economic resilience [7]. Addressing these constraints requires strategic policies that prioritize vocational education and promote collaboration between educational institutions and industries to ensure training programs remain effective and relevant.

4.3 Comparative Analysis with General Education

Comparing vocational training with general education in Spain reveals distinct contributions to workforce development and employability. Vocational training focuses on providing specific skills directly applicable to the labor market, while general education emphasizes a broader curriculum aimed at developing critical thinking and adaptability, essential for long-term career progression in a dynamic economy [5].

Vocational training offers the advantage of immediate skill applicability, facilitating smoother employment transitions and often resulting in favorable early career earnings [8]. This alignment with industry needs is crucial for addressing Spain's high youth unemployment [4]. However, the specialization inherent in vocational training may limit long-term career adaptability as labor market demands evolve [3].

Conversely, general education provides a comprehensive experience, fostering a wide range of skills that enhance adaptability and long-term employability. This broader approach supports the

development of transversal competences, such as critical thinking and problem-solving, increasingly valued by employers in a rapidly changing global economy [3]. Consequently, individuals with a general education background may enjoy improved employment rates over their life-cycle, better preparing them for career transitions and shifts in labor market demands [5].

Despite their differences, both vocational training and general education aim to enhance workforce readiness and support economic growth. Integrating transversal competences into vocational curricula is vital for bridging the gap between these educational pathways, ensuring graduates possess the adaptability and critical thinking skills necessary for long-term success [3]. Moreover, public investment in education, as indicated by societal preferences, highlights the importance of both vocational and general education in fostering economic resilience and development [7].

5 Comparative Education Study

5.1 Effectiveness of Vocational Training Models

The vocational training models in Germany and Spain present distinct characteristics that shape their effectiveness and labor market outcomes. Germany's dual vocational education system is renowned for integrating theoretical learning with practical training, facilitating seamless transitions from education to employment and providing short-term earnings benefits due to the immediate applicability of skills [9]. However, it may not consistently support long-term earnings growth compared to general education pathways.

In Spain, recent reforms to implement dual vocational education and training (dual VET) aim to enhance employability and educational quality. Despite these efforts, studies indicate that dual VET has not significantly improved educational outcomes or alignment with labor market demands [10], highlighting the ongoing challenge of aligning educational policies with market needs [3]. Data from the Great Recession illustrates the impact of these models on youth outcomes, showing Germany's resilience in maintaining low youth unemployment rates [4], whereas Spain's vocational training system has struggled in this regard, underscoring the necessity for cohesive strategies that effectively engage employers and incorporate practical training [6].

The role of small and medium-sized enterprises (SMEs) is pivotal in vocational training. Schumpeterian SMEs drive innovation and growth, enhancing the effectiveness of vocational training models [1]. A collaborative framework for employer engagement, as suggested in various contexts, could elevate apprenticeship quality and better align training with industry requirements [6].

5.2 Competence Assessment and Employability

Competence assessment in vocational education is crucial for ensuring alignment with labor market needs and enhancing employability. Germany's dual vocational education system incorporates competence assessment within both classroom and workplace training, emphasizing the acquisition of industry-specific skills evaluated through practical examinations and continuous performance assessments by educational institutions and employers [9]. This comprehensive approach equips students with the competencies necessary for smooth transitions to employment.

Conversely, Spain's vocational training system faces challenges in effectively assessing competencies, particularly within the context of dual VET reforms. While practical training has been integrated into the curriculum, assessments often focus on theoretical knowledge, failing to adequately capture the practical skills needed in the labor market [10]. This gap necessitates enhanced collaboration between educational institutions and employers to create comprehensive assessment frameworks that encompass both technical and transversal competences, such as problem-solving and adaptability [3].

The impact of competence assessment on employability is evident in the employment outcomes of graduates in Germany and Spain. Germany's robust assessment framework contributes to low youth unemployment rates by ensuring that graduates possess the skills employers demand [4]. Conversely, Spain's disconnect between competence assessment and labor market needs has hindered the employability of vocational training graduates, emphasizing the importance of aligning educational policies with industry requirements [6]. Transversal competences, including critical thinking, communication, and adaptability, are increasingly valued in the modern labor market and contribute to long-term

career success [3]. Therefore, vocational education systems must prioritize the integration and assessment of these competences to equip graduates for the complexities of today's workforce.

5.3 Public Perception and Policy

Public perception significantly influences vocational education policy in Germany and Spain, shaping educational spending and reform initiatives. Germany's dual vocational education system enjoys strong societal support, reflected in public opinion surveys that favor investments in vocational education to foster economic resilience and development [7]. This positive perception stems from the system's success in maintaining low youth unemployment rates and providing clear pathways from education to employment.

In Spain, public attitudes towards vocational education are evolving, particularly with recent reforms aimed at improving the quality and relevance of vocational training. The expansion of dual VET has generated cautious optimism among stakeholders, recognizing the potential benefits of integrating practical training with classroom instruction. However, challenges remain in reshaping public perception to acknowledge vocational education as a credible and valuable educational pathway, which is essential for equipping individuals with both technical skills and transversal competences. Collaboration among policymakers, industry stakeholders, and educators is critical to addressing these perceptions and aligning VET with labor market demands [9, 7, 3]. Historical biases favoring general and higher education as primary routes to career success necessitate efforts to raise awareness of vocational training's advantages in addressing youth unemployment and meeting labor market needs.

Policy decisions in both countries are influenced by public perceptions, guiding governments to align educational policies with societal preferences and economic priorities. In Germany, strong support for vocational education has facilitated continued investment in the dual system, ensuring its sustainability amidst economic changes. Conversely, policymakers in Spain face the challenge of addressing public concerns about vocational education through targeted reforms that enhance its perception. This includes fostering collaboration with industry stakeholders to align vocational training with evolving labor market demands. Recent reforms, inspired by the dual education model, emphasize adapting vocational education to changes in the productive environment, thereby promoting better integration of educational institutions with local businesses. Additionally, there is a growing recognition of the need to enhance students' transversal competences, essential for employability, highlighting the collaborative role of educators, policymakers, and industry in this endeavor [10, 7, 9, 3, 2].

Public perception significantly influences vocational education policy, guiding resource allocation and reform initiatives. Recent surveys indicate that public support for vocational education and training (VET) often exceeds that for higher education, particularly in regions facing high youth unemployment. This trend underscores the recognition of VET's role in facilitating transitions from education to employment, especially in areas where VET pathways are underdeveloped. Consequently, increasing public investment in VET has become a priority, reflecting broader societal attitudes towards education spending and workforce development [2, 7]. By understanding and addressing public attitudes towards vocational education, Germany and Spain can formulate policies that bolster the growth and effectiveness of their vocational training systems, ultimately contributing to workforce development and economic resilience.

6 International Education Policy and Vocational Education Reform

6.1 Public Opinion and Economic Constraints

Public opinion and economic constraints are pivotal in shaping international vocational education policies, dictating resource allocation and reform trajectories. The dual vocational education and training (dual VET) systems, which integrate practical and academic learning, have gained recognition for enhancing student engagement and outcomes [10]. Many voters advocate for increased educational investment, even at the cost of higher taxes, reflecting a societal consensus on education's role in economic resilience and workforce development [7]. However, economic constraints, such as limited public budgets and competing fiscal priorities, often hinder policy implementation, necessitating strategic resource allocation to ensure sustainable educational reforms.

Cultural contexts significantly shape youth transitions and public perceptions of vocational education [4]. Cultural attitudes can influence the perceived value and enrollment rates in vocational training, prompting policymakers to improve the image of vocational education as a viable student option. Small and medium-sized enterprises (SMEs) are integral to vocational training success but face challenges like limited financing and inadequate institutional support for workforce development [1]. Addressing these economic constraints through targeted policies and financial incentives is crucial for enabling SMEs to effectively participate in vocational education programs.

Institutional features, including flexible education structures and active labor market policies, are essential for facilitating organized adult learning and mitigating economic constraints by aligning vocational education with labor market demands [2].

6.2 Institutional Support and Economic Resilience

Institutional support is crucial for bolstering the economic resilience of vocational education systems, providing the necessary infrastructure, resources, and policy frameworks for effective training and workforce development. In Germany, strong institutional frameworks underpin the dual vocational education system, establishing regulatory structures that define roles for educational institutions, employers, and trainees. This ensures consistency and quality assurance in vocational training, contributing to low youth unemployment rates and economic stability [1].

In Spain, recent vocational education reforms stress the need for enhanced institutional support to align training programs with industry needs. The dual VET model, which integrates practical training with classroom instruction, is central to these reforms. However, the model's success in improving employability depends on robust institutional support, particularly in fostering collaboration between educational institutions and employers [10]. Institutional support should also include resources and incentives for SMEs to engage in vocational training programs. These enterprises are key partners in the dual system, providing hands-on training and contributing to curriculum development. Yet, challenges like limited access to finance and inadequate institutional support can impede SME participation [1]. Targeted policies and financial incentives are needed to enhance SMEs' capacity to support vocational training, thereby strengthening the system's economic resilience.

Moreover, the political economy of adult learning systems highlights the importance of institutional features that encourage continuous learning and adaptation to economic changes [2]. Flexible education structures and active labor market policies are vital components of institutional support, enabling vocational education systems to respond effectively to evolving labor market needs.

6.3 Curriculum Adaptation and Youth Employment

Curriculum adaptation is key to improving youth employment outcomes by ensuring vocational education and training (VET) programs remain relevant to labor market dynamics. Integrating practical training components, such as internships, within VET curricula enhances employability by providing students with hands-on experience and industry-specific skills valued by employers [3]. Aligning educational content with current labor market demands facilitates smoother transitions from education to employment, thereby reducing youth unemployment rates.

The dual VET models, exemplified by Germany and increasingly in Spain, highlight the advantages of curriculum adaptation. These models combine classroom instruction with workplace training, allowing students to apply theoretical knowledge in real-world settings. The success of dual VET relies on establishing robust collaborations between educational institutions and businesses, prioritizing continuous curriculum updates to align with industry innovations and requirements. Research underscores the importance of such partnerships in addressing challenges in implementing dual VET systems, facilitating the integration of practical experiences and the acquisition of transversal competencies crucial for labor market success [6, 9, 10, 3].

Additionally, assessing transversal competencies like problem-solving, adaptability, and critical thinking is critical for preparing students for a rapidly evolving labor market. Developing robust assessment tools for these competencies enhances vocational education effectiveness by ensuring graduates possess the necessary skills for diverse employment contexts and career pathways [3]. This approach not only improves immediate employment prospects but also supports long-term career adaptability and growth.

Future research should explore the long-term impacts of educational choices on employment outcomes, considering individual heterogeneity and the potential for reforming vocational education to enhance effectiveness [8]. Furthermore, examining the role of adult education and retraining programs can provide insights into how vocational education systems can support lifelong learning and career development [5].

7 Conclusion

The examination of vocational education systems in Germany and Spain underscores their essential contribution to aligning education with labor market demands, thus enhancing workforce preparedness and employability. Germany's dual system, integrating theoretical instruction with practical training, exemplifies an effective model that ensures seamless transitions from education to employment, maintaining low youth unemployment even during economic downturns. Spain's recent initiatives, particularly the adoption of dual VET, aim to better align vocational training with industry needs, although challenges remain in fully harnessing its potential.

The findings suggest that vocational education provides notable short-term employment benefits, yet the long-term adaptability of graduates depends significantly on the incorporation of transversal competences like problem-solving and adaptability. Embedding these competences within vocational curricula is crucial for improving employability and facilitating career advancement in a dynamic job market.

International education policy implications highlight the importance of institutional support and public investment in vocational education as key drivers of economic resilience and workforce development. Policy decisions must consider public opinion and economic limitations, necessitating strategies that align societal preferences with financial realities.

Future research should focus on developing comprehensive support systems for SMEs in developing countries, drawing on successful SME ecosystems to enhance their role in vocational training. Additionally, exploring the integration of specific institutional features into existing frameworks and evaluating the impact of public policies on adult learning participation will provide valuable insights into the adaptability of vocational education systems to socio-economic changes.

The comparative study of vocational education systems in Germany and Spain offers vital insights for international education policy and reform, underscoring the need for adaptable and responsive training models that promote lifelong learning and economic growth.

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