



Humanizing Industry 5.0 through Society 5.0: Vocational Education, Social Cohesion, and Human-Centered Development in Australia

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Abstract- This paper examines how Society 5.0 can humanize Industry 5.0 through vocational education, social cohesion, and human-centered development in Australia. It argues that technical and vocational education should integrate interpersonal skills, civic engagement, and participatory learning alongside technical competencies to strengthen social inclusion and community resilience. Using a qualitative multi-method approach based on literature review and policy analysis, the study explores the relationship between education, employability, and inclusive socio-industrial development. The findings highlight that human-centered vocational curricula can enhance workforce adaptability, reduce social alienation, and support sustainable economic and social transformation. The study emphasizes the importance of aligning technological advancement with human well-being, inclusivity, and ethical development within Australia's evolving Industry 5.0 and Society 5.0 transition.

Keywords- Australia, Industry 5.0, Society 5.0, Vocational Education, Social Cohesion, Human-Centered Development.

I. Introduction

The transition toward Industry 5.0 represents a major transformation in production systems, emphasizing collaboration between humans and advanced technologies such as artificial intelligence, robotics, and cyber-physical systems (European Commission, 2021; Ghobakhloo, 2023). While Industry 5.0 promotes technological innovation and productivity, it also raises concerns regarding social inequality, workforce adaptation, and human well-being. In response, Society 5.0 offers a human-centered framework that prioritizes inclusivity, social well-being, and the integration of technology for societal benefit (Fukuyama, 2018; Japan Cabinet Office, 2021).

Within this transition, vocational education plays a critical role in preparing individuals for evolving labour markets while supporting broader social development. Beyond technical competencies, contemporary vocational education increasingly requires the integration of interpersonal skills, communication, teamwork, and civic engagement to ensure that technological advancement remains socially inclusive and ethically grounded (Carayannis & Morawska-Jancelewicz, 2022).

Australia's Vocational Education and Training (VET) system represents one of the world's most extensive vocational education networks, serving millions of learners annually through TAFE institutes, registered training organisations, and vocational pathways delivered across universities and training centres (NCVER, 2024; Payne, 2019). This broad institutional reach positions vocational education as both an economic and social mechanism capable of supporting workforce adaptability, social inclusion, and community participation.



This paper argues that human-centered vocational education is essential for aligning Industry 5.0 with the principles of Society 5.0 in Australia. Specifically, the integration of soft skills, participatory pedagogies, and inclusive learning approaches into technical training can strengthen social cohesion, reduce social alienation, and enhance long-term socio-industrial resilience. The study therefore examines how vocational education can contribute to human-centered development by balancing technological progress with social well-being and inclusivity.

II. Methodology

Research Design

This study adopts a qualitative interpretivist research design to examine the relationship between Industry 5.0, Society 5.0, vocational education, and human-centered development in Australia. A qualitative approach is appropriate because the study focuses on complex social and educational processes, including social cohesion, interpersonal skills, inclusion, and workforce adaptation (Braun & Clarke, 2006). The research integrates two complementary strategies: a systematic literature review and policy analysis.

The interpretivist approach enables conceptual analysis of how technological transformation intersects with educational and social development. The study positions vocational education not only as a mechanism for technical training but also as a platform for fostering inclusivity, civic participation, and social resilience within technologically evolving societies.

Data Sources and Collection

The study relies exclusively on secondary qualitative data. Sources include peer-reviewed academic literature, Australian government reports, vocational education policy documents, and international frameworks related to Industry 5.0, Society 5.0, and future workforce development.

Key sources include publications from Australian vocational education bodies, the National Centre for Vocational Education Research (NCVER), OECD reports, UNESCO publications, and policy frameworks concerning digital transformation and human-centered development. These sources provide theoretical and policy-oriented insights relevant to Australia's evolving socio-industrial environment.

The use of secondary data ensures methodological consistency and enables broad comparative analysis across educational, technological, and social policy literature.

Analytical Approach

The study employs thematic analysis following the framework proposed by Braun and Clarke (2006). This method enables the identification and interpretation of recurring themes across literature and policy documents.

The analysis was conducted in four stages. First, relevant literature and policy materials were systematically reviewed and categorized. Second, initial coding identified recurring concepts related to technical competencies, soft skills, social inclusion,



workforce adaptability, and human-centered learning. Third, these codes were grouped into broader thematic categories, including:

- Human-centered vocational education
- Soft skills and employability
- Social cohesion and inclusion
- Workforce adaptability in Industry 5.0

Finally, the themes were interpreted within the integrated Industry 5.0–Society 5.0 framework to examine how vocational education can support socially inclusive technological transformation in Australia.

Conceptual Synthesis Framework

To strengthen analytical consistency, the study develops a conceptual synthesis framework based on recurring patterns identified across interdisciplinary literature and policy reports (OECD, 2020; UNESCO, 2016; World Economic Forum, 2020). The framework examines the relationship between technical learning, interpersonal competencies, and social inclusion within vocational education systems.

The analysis focuses on three interconnected dimensions:

1. Educational Dimension – technical competencies, soft skills, and curriculum design
2. Social Dimension – inclusion, participation, and social cohesion
3. Development Dimension – workforce adaptability, innovation, and human-centered growth

This framework enables a structured examination of how vocational education can contribute to both economic transformation and social well-being within the transition toward Industry 5.0 and Society 5.0.

Validity and Limitations

The validity of the study is supported through methodological triangulation, combining literature review and policy analysis. The use of diverse academic and institutional sources enhances analytical reliability and conceptual depth.

However, several limitations should be acknowledged. First, the study relies solely on secondary data and does not include primary empirical research such as interviews or surveys. Second, the findings are conceptual rather than statistically generalizable. Third, the analysis focuses specifically on the Australian context, which may limit direct applicability to other socio-economic settings.

Future research may expand this work through empirical investigations into vocational education outcomes, soft skills development, and human-centered learning practices within Industry 5.0 environments.

Ethical Considerations

This study does not involve direct human participants. All data are derived from publicly available academic and policy sources, ensuring compliance with ethical standards for secondary qualitative research. The study adopts an inclusive and human-



centered perspective focused on education, social well-being, and equitable development within technologically transforming societies.

III. Conceptual Framework: Humanizing Industry 5.0 through Society 5.0

Reframing Industry 5.0: From Automation to Human-Centered Development

Industry 5.0 represents a transition beyond the automation-focused model of Industry 4.0 by emphasizing collaboration between humans and advanced technologies such as artificial intelligence, robotics, and cyber-physical systems (European Commission, 2021; Longo et al., 2020). While Industry 4.0 largely prioritized efficiency, digitization, and productivity, Industry 5.0 introduces a stronger focus on human well-being, creativity, and socially sustainable innovation.

A central feature of Industry 5.0 is human-machine collaboration, where technology is designed to support and enhance human capabilities rather than replace them. In this context, interpersonal communication, adaptability, creativity, and problem-solving remain essential competencies within technologically advanced workplaces (Longo et al., 2020). As industries become increasingly digitized, the workforce requires not only technical expertise but also the ability to collaborate effectively within dynamic and interdisciplinary environments.

Another important dimension of Industry 5.0 is the shift toward customization and innovation. Modern production systems increasingly rely on flexible and creative approaches that combine technological precision with human judgment and social intelligence (Nahavandi, 2019). This transformation expands the role of vocational education beyond technical training by requiring broader competencies associated with teamwork, communication, and lifelong learning.

Industry 5.0 also emphasizes worker well-being and inclusive workplace development. Human-centered production systems recognize that sustainable productivity depends on supportive working environments, workforce participation, and opportunities for continuous skill development. In Australia, vocational education institutions have increasingly incorporated employability skills, student support services, and collaborative learning approaches to prepare learners for evolving labour market demands.

However, technological transformation may also widen social and economic inequalities if access to education, training, and digital skills remains uneven. This highlights the importance of aligning Industry 5.0 with a broader human-centered framework that promotes inclusion, participation, and social well-being.

Society 5.0: A Human-Centered Framework for Inclusive Development

Society 5.0, first introduced in Japan, envisions a “super-smart society” where technological innovation is integrated with social development to improve quality of life and human well-being (Fukuyama, 2018; Japan Cabinet Office, 2021). Unlike technology-driven development models focused primarily on economic growth, Society 5.0 emphasizes inclusivity, sustainability, and balanced human development.



A key principle of Society 5.0 is social inclusion. The framework seeks to reduce inequalities in access to education, digital infrastructure, employment opportunities, and social participation. Within this perspective, education systems play an essential role in ensuring that technological advancement benefits broader society rather than only highly skilled sectors of the economy.

Another important dimension is sustainability, which includes economic resilience, social stability, and long-term human development. Society 5.0 promotes the idea that technological progress should contribute to equitable growth and community well-being. In the Australian context, vocational education linked to emerging industries such as renewable energy, digital technologies, and sustainable construction can support both economic participation and inclusive development.

The framework also highlights the importance of digital integration for public benefit. Digital technologies are increasingly embedded within education, employment, and social interaction, creating new opportunities for learning, communication, and workforce participation. Consequently, vocational education must equip learners with not only technical capabilities but also digital literacy, critical thinking, and collaborative skills required within digitally connected societies.

Bridging Industry 5.0 and Society 5.0: The Role of Vocational Education

The integration of Industry 5.0 and Society 5.0 requires educational systems capable of balancing technological advancement with human-centered development. Vocational education provides an important institutional platform for achieving this balance by combining workforce preparation with social inclusion and lifelong learning.

First, human-centered vocational education may integrate technical competencies with interpersonal and employability skills. Traditional vocational models focused primarily on occupational training are increasingly being expanded to include communication, teamwork, adaptability, and problem-solving capabilities that are necessary within technologically evolving workplaces (Becker, 1964; Heckman & Kautz, 2012).

Second, vocational education can strengthen social cohesion by promoting inclusive participation and collaborative learning environments. Soft skills development, civic engagement, and participatory pedagogies contribute to stronger social connectedness and workplace integration. In Australia, vocational education reforms have increasingly emphasized employability frameworks and learner-centered approaches that support both economic participation and personal development.

Third, policy alignment between technological innovation, education, and social development is essential for sustainable socio-industrial transformation. Industry 5.0 and Society 5.0 both require coordinated strategies that support workforce adaptability, digital inclusion, and equitable access to skills development. This highlights the importance of vocational education policies that prioritize human well-being alongside economic competitiveness.

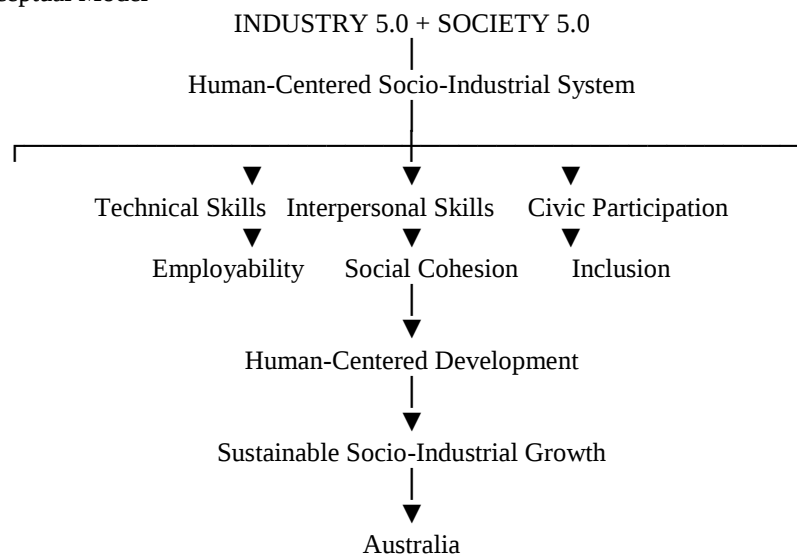


Conceptual Synthesis

This study conceptualizes vocational education as a central link between Industry 5.0 and Society 5.0. By integrating technical training with interpersonal skills, inclusive pedagogies, and human-centered learning, vocational education can support both workforce transformation and social well-being.

The framework proposes that human-centered vocational education contributes to employability, workforce adaptability, social cohesion, and inclusive socio-industrial development in Australia. Rather than viewing technological progress solely through the lens of productivity, the study emphasizes the importance of aligning innovation with human development, participation, and social sustainability.

Conceptual Model



Source: Adapted from Xu, X., Lu, Y., Vogel-Heuser, B., & Wang, L. (2022). Industry 5.0 and Society 5.0-Comparison, complementation and co-evolution. *Journal of Manufacturing Systems*, 64, 424–428.

IV. Theoretical Frameworks

This study is grounded in four complementary theoretical perspectives: Human Capital Theory, Social Cohesion Theory, Socio-Technical Systems Theory, and Civic Resilience Theory. Together, these frameworks explain how vocational education can support human-centered development, workforce adaptability, and social inclusion within Australia's transition toward Industry 5.0 and Society 5.0.

Human Capital Theory and Human-Centered Skills Development

Human Capital Theory, developed by Becker (1964), argues that investment in education and skills enhances productivity, employability, and economic participation. Traditionally associated with economic outcomes, the theory has increasingly



expanded to include interpersonal capabilities, adaptability, and lifelong learning within knowledge-based economies.

In the context of Industry 5.0, human capital extends beyond technical expertise to include communication, teamwork, creativity, and problem-solving skills. Technologically advanced workplaces require workers who can collaborate effectively with intelligent systems while also engaging in flexible and socially interactive work environments.

Australia's vocational education system plays an important role in developing these competencies. Institutions such as TAFE and vocational training providers contribute to workforce readiness by combining technical learning with employability skills and practical training pathways. This broader understanding of human capital aligns with the principles of Society 5.0, which emphasize inclusive development and human well-being alongside economic productivity.

From this perspective, vocational education contributes not only to labour market participation but also to social integration, workforce resilience, and long-term human-centered development.

Social Cohesion Theory and Inclusive Development

Social Cohesion Theory emphasizes the importance of trust, participation, inclusion, and shared social values in maintaining stable and resilient societies (Putnam, 2000). High levels of social cohesion are associated with stronger civic participation, community engagement, and social well-being.

Within technologically transforming societies, social cohesion becomes increasingly important as rapid digitalization and economic change may create inequalities in access to education, employment, and technological opportunities. Society 5.0 addresses these challenges by promoting inclusive participation and equitable access to technological and social resources.

Vocational education can strengthen social cohesion by creating inclusive learning environments that encourage collaboration, teamwork, and community participation. In Australia, vocational education institutions increasingly emphasize learner-centered approaches, employability skills, and collaborative learning models that support both workforce integration and social connectedness.

The theory therefore supports the argument that education systems contribute to broader social development by fostering participation, inclusion, and interpersonal engagement within evolving socio-industrial environments.

Socio-Technical Systems Theory and the Industry 5.0–Society 5.0 Nexus

Socio-Technical Systems Theory explains the interdependence between technological systems and social structures. The theory argues that technological transformation cannot be understood independently from human behaviour, institutional arrangements, and social values.



This perspective is central to understanding the relationship between Industry 5.0 and Society 5.0. Industry 5.0 focuses on advanced technologies such as artificial intelligence, robotics, and cyber-physical systems, while Society 5.0 emphasizes the use of these technologies to improve human well-being, inclusivity, and quality of life. In Australia, digital transformation is reshaping labour markets, education systems, and workplace structures. As industries adopt advanced technologies, vocational education must prepare learners not only with technical competencies but also with digital literacy, adaptability, collaboration, and critical thinking skills.

Socio-Technical Systems Theory therefore highlights the importance of aligning technological innovation with human-centered educational policies. Vocational education serves as a bridge between technological advancement and social development by ensuring that learners can effectively participate in digitally integrated economies and societies.

Civic Resilience Theory and Community Participation

Civic Resilience Theory emphasizes the role of civic engagement, participation, and social belonging in strengthening societal resilience and long-term stability (Norris, 2011). Individuals who actively participate in education, employment, and community life are more likely to develop social connectedness, institutional trust, and a sense of shared responsibility.

Within the context of Society 5.0, civic resilience supports the development of inclusive and participatory societies where technological progress is balanced with human well-being and community engagement. Vocational education contributes to civic resilience by creating structured pathways for workforce participation, collaborative learning, mentoring, and social interaction.

In Australia, vocational institutions provide opportunities for learners to develop not only occupational skills but also interpersonal relationships, teamwork capabilities, and community engagement experiences. Apprenticeships, work-integrated learning, and learner-centered training environments strengthen both employability and social participation.

Civic Resilience Theory complements the Industry 5.0 and Society 5.0 by emphasizing that sustainable technological transformation requires socially connected and actively engaged individuals. Human-centered education systems therefore play a significant role in supporting both workforce adaptability and inclusive societal development.

Theoretical Synthesis

Taken together, these theoretical frameworks provide a comprehensive foundation for understanding the relationship between vocational education, technological transformation, and human-centered development in Australia.

The frameworks collectively demonstrate that:

1. Human capital in Industry 5.0 includes both technical and interpersonal competencies.
2. Social cohesion supports inclusive participation and community well-being.



3. Technological systems must be aligned with social and human-centered values.
4. Civic participation and engagement strengthen workforce adaptability and societal resilience.

The integration of these theories reinforces the central argument of this study: humanizing Industry 5.0 through the principles of Society 5.0 requires vocational education systems that combine technical training with interpersonal skills, inclusivity, and human-centered learning. Such an approach supports sustainable socio-industrial transformation while strengthening social cohesion and long-term human development in Australia.

V. Literature Review

Vocational Education and Human-Centered Development

A growing body of literature recognizes vocational education as an important mechanism for supporting workforce adaptability, employability, and inclusive socio-economic development within technologically transforming societies (UNESCO, 2016; OECD, 2020). As economies transition toward Industry 5.0, education systems are increasingly expected to prepare learners not only with technical competencies but also with the interpersonal and adaptive skills required in digitally integrated workplaces. Research indicates that vocational education contributes significantly to labour market participation by providing practical training, industry-relevant competencies, and pathways into employment. In Australia, institutions such as TAFE and other vocational education providers play a central role in workforce preparation, particularly in sectors experiencing rapid technological change.

However, the literature also suggests that vocational education should move beyond narrow technical training models. Contemporary educational frameworks increasingly emphasize the importance of human-centered learning approaches that combine technical expertise with communication, teamwork, adaptability, and lifelong learning. This broader perspective aligns with the principles of Society 5.0, which prioritize social inclusion, well-being, and balanced human development alongside technological innovation.

Existing studies therefore highlight the need for vocational education systems that support both economic participation and broader social development within Industry 5.0 environments.

Soft Skills, Employability, and Social Cohesion

The importance of soft skills; including communication, teamwork, empathy, problem-solving, and emotional intelligence, has received increasing attention in education and labour market research (Heckman & Kautz, 2012; European Commission, 2021). These competencies are considered essential within Industry 5.0 workplaces, where collaboration between humans and advanced technologies requires adaptability and interpersonal interaction.

Beyond employability, soft skills also contribute to social cohesion and inclusive participation. Research in sociology and education suggests that individuals with strong interpersonal competencies are better able to engage in collaborative environments,



maintain social relationships, and participate effectively within diverse communities (Putnam, 2000).

Studies further indicate that collaborative learning environments and learner-centered pedagogies can strengthen social connectedness, civic engagement, and workforce integration. In vocational education settings, the integration of soft skills supports both workplace readiness and broader human-centered development.

Despite their recognized importance, the literature shows that many vocational education systems continue to prioritize technical competencies over interpersonal development. This imbalance may limit workforce adaptability and reduce the capacity of education systems to support inclusive socio-industrial transformation. The present study contributes to this discussion by emphasizing the systematic integration of soft skills within vocational education frameworks aligned with Industry 5.0 and Society 5.0.

Technology, Work, and Workforce Transformation

The rapid advancement of digital technologies, artificial intelligence, automation, and cyber-physical systems has fundamentally transformed labour markets and workplace structures (Schwab, 2016; Nahavandi, 2019). These developments underpin the transition toward Industry 5.0, where technological innovation is increasingly combined with human-centered production systems.

Research suggests that technological transformation creates both opportunities and challenges for workforce development. While advanced technologies may improve productivity and innovation, they also require workers to continuously adapt to changing skill demands. Individuals lacking access to education, digital literacy, or training opportunities may experience barriers to labour market participation.

In response, scholars argue that education systems must evolve to support workforce adaptability, lifelong learning, and inclusive access to emerging opportunities. Within this context, vocational education becomes particularly important because it connects technical training with practical workforce preparation.

The literature also emphasizes that future-oriented education systems should incorporate digital literacy, critical thinking, collaboration, and problem-solving skills alongside technical competencies. These capabilities are increasingly viewed as essential for successful participation within technologically integrated economies and societies.

Social Inclusion and Human-Centered Societies

Social inclusion and community participation are widely recognized as central components of sustainable and resilient societies (Putnam, 2000; Sachs, 2015). Society 5.0 builds upon these principles by advocating for technological systems that improve quality of life, reduce inequalities, and promote inclusive development.

Research demonstrates that inclusive education systems can strengthen social cohesion by creating opportunities for participation, collaboration, and equal access to skills



development. In multicultural and technologically evolving societies such as Australia, education plays an important role in supporting social connectedness and workforce inclusion across diverse populations.

Vocational education contributes to these goals by providing accessible pathways into employment, practical learning opportunities, and collaborative learning environments. Learner-centered approaches, apprenticeships, and work-integrated learning models can further strengthen social participation and workforce engagement.

The literature therefore highlights the importance of aligning technological transformation with inclusive educational policies that support both economic development and human well-being.

Gaps in the Literature and Contribution of the Study

Despite the growing scholarship on Industry 5.0, Society 5.0, and vocational education, several important gaps remain.

First, much of the existing research focuses primarily on technological innovation and economic productivity, with less attention given to human-centered development and social cohesion. Second, while soft skills are widely acknowledged as important for employability, their broader role in inclusive socio-industrial transformation remains underexplored within vocational education research.

Third, studies examining Industry 5.0 and Society 5.0 often treat technological and social dimensions separately rather than as interconnected processes. Limited research specifically examines how vocational education can function as a bridge between technological advancement and inclusive societal development.

Finally, there remains a need for context-specific research examining these issues within Australia's vocational education landscape and socio-industrial transition.

This study addresses these gaps by adopting an interdisciplinary framework that integrates vocational education, social cohesion, interpersonal skills, and human-centered development within the combined Industry 5.0–Society 5.0 perspective. The study contributes to existing literature by emphasizing that vocational education should not only prepare individuals for technologically advanced workplaces but also support inclusion, participation, and sustainable socio-industrial growth in Australia.

VI. Discussion: Vocational Education, Social Cohesion, and Human-Centered Development in Australia

Australia's Socio-Industrial Transition and Human-Centered Development

Australia's transition toward Industry 5.0 is reshaping labour markets, educational systems, and workplace environments through the growing integration of digital technologies, automation, and artificial intelligence. While these developments create opportunities for innovation and productivity, they also increase the need for human-centered policies that support inclusion, workforce adaptability, and social well-being.



Within this transition, Society 5.0 provides an important conceptual framework by emphasizing the integration of technological advancement with human development, participation, and social sustainability. The Australian context demonstrates that economic transformation alone is insufficient unless accompanied by educational systems capable of preparing individuals for both technological and social change.

Vocational education therefore emerges as a central institutional mechanism for supporting this socio-industrial transition. Beyond technical training, vocational education contributes to workforce participation, lifelong learning, and inclusive access to emerging economic opportunities. In this regard, vocational education functions not only as an economic instrument but also as a platform for social integration and human-centered development.

The Scale and Significance of Australia's VET System

Australia's Vocational Education and Training (VET) system represents one of the largest and most diverse vocational education networks globally. The sector includes thousands of registered training organisations, TAFE institutes, community education providers, and vocational pathways delivered through universities and industry partnerships (NCVER, 2024; ABS, 2023).

Serving millions of learners annually, the VET system plays a major role in workforce preparation across technologically evolving industries. Its broad institutional reach enables participation from diverse social, cultural, and economic groups, making vocational education an important site for both skills development and social inclusion. This scale is particularly significant within the context of Industry 5.0 and Society 5.0. As labour markets increasingly demand adaptable and digitally capable workers, vocational education institutions provide opportunities for reskilling, upskilling, and lifelong learning. At the same time, they create structured environments where learners can develop interpersonal relationships, collaborative skills, and community participation.

The diversity of Australia's VET system also reflects the broader multicultural character of Australian society. Through inclusive access to education and workforce pathways, vocational education contributes to social participation and broader socio-economic integration.

Vocational Education and Interpersonal Skills Development

A central argument emerging from this study is that technical education alone is insufficient within Industry 5.0 environments. While technical competencies remain essential, rapidly changing workplaces increasingly require communication, teamwork, adaptability, problem-solving, and emotional intelligence.

Human-centered vocational education therefore requires the systematic integration of interpersonal skills into technical training programs. These competencies support both employability and broader social development by enabling individuals to work collaboratively, navigate diverse environments, and adapt to technological change.



In Australia, vocational education reforms increasingly emphasize employability skills frameworks, learner-centered pedagogies, and work-integrated learning approaches. Apprenticeships, mentoring systems, collaborative projects, and industry partnerships contribute to the development of both occupational competencies and interpersonal capabilities.

The findings suggest that interpersonal skills strengthen workforce adaptability while also supporting social cohesion and inclusion. Individuals who participate in collaborative educational environments are more likely to develop communication skills, confidence, civic engagement, and a sense of belonging within both workplace and community contexts.

Social Cohesion and Inclusive Participation

The discussion further highlights the relationship between vocational education and social cohesion within technologically transforming societies. Society 5.0 emphasizes that technological innovation should contribute to inclusive participation and improved quality of life rather than deepening existing inequalities.

Vocational education contributes to these objectives by expanding access to learning opportunities, supporting workforce inclusion, and creating pathways for participation in emerging industries. Inclusive educational environments encourage collaboration across diverse groups and strengthen social connectedness within multicultural societies such as Australia.

However, the study also indicates that technological transformation may intensify social inequalities if education and training opportunities remain unevenly distributed. Individuals lacking access to digital skills, lifelong learning, or adaptive training pathways may experience barriers to workforce participation and broader socio-economic inclusion.

For this reason, vocational education policies aligned with Society 5.0 should prioritize accessibility, inclusion, digital literacy, and human-centered learning approaches. Such policies can strengthen both workforce resilience and long-term social sustainability.

Humanizing Industry 5.0 through Society 5.0

The findings reinforce the importance of aligning Industry 5.0 with the human-centered principles of Society 5.0. While Industry 5.0 introduces advanced technological systems, Society 5.0 provides the social and ethical framework necessary to ensure that technological transformation supports human well-being and inclusive development.

Vocational education represents a practical mechanism for operationalizing this alignment. By integrating technical training with interpersonal skills, civic participation, and inclusive pedagogies, vocational institutions can support both economic competitiveness and social cohesion.

This approach redefines vocational education as more than workforce preparation alone. Instead, it positions education as a broader human-centered system that supports



participation, adaptability, innovation, and social connectedness within technologically advanced societies.

The Australian context demonstrates that sustainable socio-industrial transformation depends not only on technological advancement but also on the ability of education systems to foster inclusive participation, human development, and long-term social resilience.

Discussion Synthesis

The discussion highlights several interconnected findings:

1. Australia's transition toward Industry 5.0 requires educational systems that balance technological innovation with human-centered development.
2. The VET sector possesses significant structural capacity to support workforce adaptability and inclusive socio-economic participation.
3. Interpersonal skills are increasingly essential alongside technical competencies within technologically advanced workplaces.
4. Vocational education contributes to social cohesion by promoting collaboration, participation, and inclusive learning environments.
5. Society 5.0 provides a framework for ensuring that technological transformation remains aligned with human well-being and social sustainability.

Taken together, these findings support the central argument of this study: humanizing Industry 5.0 through the principles of Society 5.0 requires vocational education systems that integrate technical skills, interpersonal development, and inclusive learning practices to strengthen both workforce readiness and human-centered socio-industrial development in Australia.

VII. Findings: Implications for Policy and Practice

The findings of this study highlight the importance of aligning technological advancement with human-centered development within Australia's transition toward Industry 5.0 and Society 5.0. The analysis demonstrates that vocational education can function as both an economic and social mechanism by supporting workforce adaptability, social cohesion, and inclusive participation.

A central finding is that technical competencies alone are insufficient in technologically advanced environments. While Industry 5.0 requires digital and technical expertise, workplaces increasingly demand interpersonal capabilities such as communication, teamwork, adaptability, empathy, and problem-solving. Vocational education systems that prioritize only technical training risk creating a skills imbalance that limits workforce adaptability and reduces social connectedness.

The study further demonstrates that the integration of soft skills into vocational education enhances both employability and human-centered development. Collaborative learning, learner-centered pedagogies, mentoring, and work-integrated learning environments strengthen not only occupational readiness but also confidence, participation, and interpersonal engagement. These competencies contribute to more inclusive and socially connected educational and workplace environments.



Another important finding concerns the role of vocational education in supporting social cohesion. Australia's multicultural and technologically evolving society requires education systems that encourage participation, inclusion, and equal access to opportunities. Vocational institutions contribute to these goals by providing accessible pathways into employment, lifelong learning, and workforce participation across diverse populations.

The findings also suggest that workforce transformation under Industry 5.0 requires coordinated policy approaches linking education, industry, and social development. Technological innovation must be accompanied by inclusive educational policies that prepare individuals for changing labour market demands while also supporting broader social well-being.

Policy Framework for Humanizing Industry 5.0

Policy Area	Key Actions	Expected Outcomes
Curriculum Reform	Integrate soft skills, digital literacy, and collaborative learning into vocational education	Enhanced employability and workforce adaptability
Industry Alignment	Strengthen partnerships between vocational institutions and industry sectors	Improved workforce readiness and lifelong learning
Human-Centered Learning	Promote learner-centered pedagogies, mentoring, and participatory learning	Greater social inclusion and interpersonal development
Social Cohesion	Expand inclusive education and community participation initiatives	Stronger social connectedness and inclusive growth
Workforce Development	Support reskilling and upskilling for emerging industries	Sustainable socio-industrial transformation

Sources for Policy Framework:

- Curriculum reform and employability skills (OECD, 2020)
- Workforce readiness and vocational education (NCVER, 2024)
- Human-centered education and lifelong learning (UNESCO, 2016)
- Social cohesion and participation (Putnam, 2000)
- Industry 5.0 and human-centered innovation (European Commission, 2021)

Human-Centered Vocational Education

The findings reinforce the argument that vocational education should be repositioned as a human-centered system rather than solely a workforce training mechanism. This approach aligns with Society 5.0, which emphasizes balancing technological innovation with human well-being, inclusivity, and sustainable development.

Human-centered vocational education includes:

- Integration of technical and interpersonal skills
- Collaborative and participatory learning approaches



- Digital literacy and adaptive learning pathways
- Inclusive access to training opportunities
- Lifelong learning and workforce flexibility

Such an approach strengthens both economic participation and broader social development by enabling learners to adapt to evolving technological environments while remaining socially connected and engaged.

Workforce Adaptability and Social Inclusion

The transition toward Industry 5.0 requires continuous workforce adaptation due to rapid technological change. The study indicates that vocational education institutions play a critical role in supporting reskilling, upskilling, and lifelong learning opportunities.

At the same time, inclusive educational policies remain essential to ensuring that technological transformation does not deepen existing inequalities. Learners who lack access to education, digital infrastructure, or adaptive training pathways may face barriers to workforce participation and socio-economic inclusion.

The findings therefore highlight the importance of accessible vocational education systems that support diverse learners, including young people, regional populations, and underrepresented groups. Inclusive workforce participation contributes not only to economic productivity but also to broader social sustainability.

Institutional Collaboration and Policy Coordination

The study further emphasizes the importance of collaboration between education providers, industry stakeholders, and government institutions. Effective socio-industrial transformation requires coordinated strategies that align workforce development with technological innovation and human-centered policy objectives.

Partnerships between vocational institutions and industry sectors can improve curriculum relevance, workplace readiness, and practical learning opportunities. Similarly, collaboration between education and social policy sectors can strengthen inclusion, participation, and long-term workforce resilience.

This integrated approach reflects the broader goals of Society 5.0, where technological systems are designed to support inclusive societal development rather than purely economic efficiency.

Analytical Synthesis

The findings collectively demonstrate that:

1. Industry 5.0 requires both technical and interpersonal competencies.
2. Vocational education is central to workforce adaptability and lifelong learning.
3. Human-centered learning strengthens employability, participation, and inclusion.
4. Social cohesion and inclusive education support sustainable socio-industrial development.
5. Society 5.0 provides an ethical and social framework for humanizing technological transformation.



Ultimately, the study shows that humanizing Industry 5.0 through the principles of Society 5.0 is essential for achieving sustainable economic growth, workforce resilience, and inclusive human-centered development in Australia. By integrating technical education with interpersonal skills, collaborative learning, and inclusive policies, vocational education systems can support both technological innovation and long-term social well-being.

VIII. Conclusion

This study demonstrates that the transition toward Industry 5.0 in Australia requires more than technological advancement and workforce automation. The analysis confirms the central argument of the article that humanizing Industry 5.0 through the principles of Society 5.0 is essential for achieving sustainable socio-industrial development, social cohesion, and human-centered progress. Technological innovation alone cannot ensure inclusive growth unless it is supported by education systems that strengthen both technical capability and interpersonal development.

Through a qualitative analysis of literature, policy frameworks, and vocational education research, the study shows that vocational education plays a strategic role in connecting economic transformation with broader social outcomes. The findings indicate that technical and vocational education becomes significantly more effective when combined with soft skills, collaborative learning, civic participation, and inclusive pedagogies. In this sense, vocational education functions not only as a workforce preparation system but also as a platform for social inclusion, adaptability, and lifelong learning.

The study further confirms that Industry 5.0 environments increasingly depend on human capabilities that cannot be replaced by automation alone, including communication, creativity, teamwork, ethical judgment, and adaptability. These competencies are essential in technologically advanced workplaces where human-machine collaboration is central. Consequently, vocational education systems that focus exclusively on technical training risk producing workforce imbalances that limit both employability and long-term social sustainability.

By integrating the human-centered principles of Society 5.0, the article demonstrates that education policy can support a more inclusive model of technological transformation. Society 5.0 provides a framework in which innovation is aligned with social well-being, participation, and equitable access to opportunities. Within this framework, vocational education contributes to reducing inequality, supporting workforce resilience, and strengthening social cohesion across diverse communities. The originality of this study lies in its integration of Industry 5.0, Society 5.0, vocational education, and social cohesion into a unified socio-industrial framework. Rather than treating technological change solely as an economic process, the study positions human-centered education as a foundational component of sustainable development in Australia's evolving industrial landscape.

Ultimately, the study proves its main argument by demonstrating that the success of Industry 5.0 depends on the simultaneous development of technological capability and



human capacity. A human-centered vocational education system—one that combines technical expertise with interpersonal skills, inclusivity, and lifelong learning—is essential for ensuring that technological transformation contributes not only to productivity and innovation but also to social cohesion, workforce resilience, and sustainable human development in Australia.

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