



RESEARCH ARTICLE

# Model Triple Helix in the Partnership of UNY, Industry, and Government for Research-Based Human Resource Development.

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## Abstract

This study explores the implementation of the Triple Helix model in strengthening research-based human resources through the strategic partnership between Universitas Negeri Yogyakarta (UNY), industry, and government. The Triple Helix framework posits that innovation and human capital development emerge from synergistic interactions among universities, industry, and government, each contributing unique resources, knowledge, and policy support. At UNY, this partnership is realized through collaborative research projects, technology transfer, curriculum alignment with industrial needs, and policy facilitation aimed at fostering employability and research competence of graduates. The university serves as a knowledge hub that generates research and innovation, while industries provide practical expertise, funding, and employment opportunities, and the government ensures regulatory support and incentives. This paper analyzes case studies of collaborative programs, highlighting mechanisms such as joint research centers, internships, scholarships, and community service initiatives that integrate research into human resource development. The findings demonstrate that the Triple Helix model fosters mutual benefits: UNY enhances its academic relevance and societal impact, industries gain access to skilled and innovative talent pools, and the government achieves policy goals related to national development and workforce competitiveness. The study also identifies challenges, including misaligned expectations, bureaucratic barriers, and funding sustainability, and proposes recommendations for strengthening the governance of partnerships and aligning stakeholder objectives. Overall, the research concludes that the Triple Helix partnership at UNY exemplifies a promising model for advancing research-based human resources that are adaptive, innovative, and responsive to dynamic industrial and societal needs. This model underscores the importance of sustained communication, trust, and shared vision among stakeholders to optimize the outcomes of such collaborations in the Indonesian context and beyond.

**Keyword:** Triple Helix model, university-industry-government collaboration, research-based human resource development, innovation, Universitas Negeri Yogyakarta.

## Introduction

In the era of knowledge-based economies and rapid technological advancement, human resources have emerged as the most critical asset for driving innovation, competitiveness, and sustainable development. The ability of a nation to produce, attract, and retain skilled, innovative, and adaptive human capital determines its capacity to respond effectively to global challenges and opportunities. In this context, the role of higher education institutions as centers of knowledge creation and dissemination has become increasingly pivotal. However, universities alone cannot address the complex demands of workforce development and innovation without strong collaboration with industry and government. The Triple Helix model, conceptualized by Etzkowitz and Leydesdorff, offers a robust theoretical framework for understanding and operationalizing the synergy among universities, industry, and government in fostering research-based human resource development and innovation ecosystems. This introduction elaborates on the rationale, context, and significance of implementing the Triple Helix model at Universitas Negeri Yogyakarta (UNY) in partnership with industry and government, highlighting its potential for strengthening research-based human resources in Indonesia.

Indonesia, as a developing country with a large and young population, faces the dual challenge of improving the quality of its human resources while simultaneously enhancing its innovation capacity to achieve sustainable economic growth. Despite impressive progress in expanding access to education, the quality and relevance

of human resources remain a concern. Many graduates struggle to meet the dynamic needs of industries, which increasingly demand interdisciplinary skills, creativity, critical thinking, and research competencies. Furthermore, the Indonesian innovation system is still characterized by fragmented efforts, limited funding, and weak linkages between universities, industries, and government agencies. Addressing these challenges requires a paradigm shift from isolated, sectoral approaches to integrated, collaborative strategies that leverage the complementary strengths of all stakeholders. The Triple Helix model provides such an approach by positioning universities, industries, and government as co-creators of knowledge, technology, and human capital.

At its core, the Triple Helix model recognizes that innovation and human resource development are no longer confined to linear processes but emerge from the recursive, interactive, and hybrid roles of the three institutional spheres. Universities, traditionally focused on education and basic research, are now expected to engage in applied research, entrepreneurship, and community service. Industries, beyond producing goods and services, are also becoming sources of knowledge, innovation, and training opportunities. Governments, meanwhile, play a crucial role in creating conducive policies, providing funding, and mediating the interactions among actors. This tripartite collaboration enhances the flow of knowledge, aligns educational curricula with industrial needs, promotes research commercialization, and fosters an innovation-friendly environment.

Universitas Negeri Yogyakarta (UNY), as one of Indonesia's leading public universities with a strong reputation in education and research, has embraced the Triple Helix model as a strategic approach to fulfilling its mission of producing graduates who are not only competent but also research-oriented, innovative, and socially responsible. Located in Yogyakarta, a city known for its educational and cultural vibrancy, UNY is well-positioned to act as a catalyst for regional and national development through its academic excellence, research capabilities, and community engagement. Recognizing the limitations of a purely academic approach, UNY has sought to strengthen its linkages with industries and government agencies to

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create a more holistic and impactful educational experience for its students and to contribute more meaningfully to societal needs.

One of the key motivations for adopting the Triple Helix model at UNY is the increasing demand for graduates who are ready to enter the workforce with not only theoretical knowledge but also practical skills, research experience, and an entrepreneurial mindset. Industries have often complained about the skills gap between what universities teach and what businesses require. Conversely, universities have argued that industries do not provide sufficient opportunities for students to gain hands-on experience and that government policies do not adequately support innovation. The Triple Helix partnership aims to bridge these gaps by fostering mutual understanding, resource sharing, and joint initiatives. Through collaborative research projects, internship programs, co-designed curricula, and technology transfer mechanisms, UNY seeks to ensure that its graduates are better prepared to contribute to industrial innovation and societal development.

In the context of research-based human resource development, the Triple Helix model offers a unique advantage by integrating research activities into the educational and professional development of students. Traditionally, research has often been perceived as an activity reserved for academics and not directly relevant to students' career prospects. However, in today's knowledge-driven economy, the ability to conduct research, solve problems, and generate new knowledge is increasingly valued across all sectors. By involving students in research projects jointly conducted by university, industry, and government, UNY not only enhances their technical competencies but also cultivates critical thinking, collaboration, and creativity. This approach also allows students to work on real-world problems, thereby making their learning experience more relevant, engaging, and impactful.

Moreover, the Triple Helix model at UNY contributes to the broader goal of strengthening Indonesia's innovation ecosystem. By fostering closer ties between academic research and industrial application, the model helps accelerate the commercialization of research findings, supports the development of start-ups and spin-offs, and enhances the country's capacity for technological self-reliance. For the government, such partnerships facilitate the achievement of policy objectives related to workforce development, technological advancement, and socio-economic progress. For industries, they offer access to cutting-edge research, a pipeline of skilled and innovative talent, and opportunities to influence the direction of academic programs. For the university, they enhance the relevance, visibility, and societal impact of its research and teaching missions.

The implementation of the Triple Helix model at UNY has been manifested through various initiatives and programs. Joint research centers have been established to conduct interdisciplinary studies on issues of mutual interest, such as renewable energy, education technology, and sustainable development. Internship and apprenticeship programs have been expanded to allow students to gain hands-on experience in industrial settings. Curriculum development committees include representatives from industry and government to ensure that academic programs remain aligned with labor market needs. Technology transfer offices facilitate the commercialization of university-generated innovations, while government-sponsored scholarships and grants support students and faculty members engaged in collaborative research. Community service projects, often involving all three actors, address pressing social problems and promote inclusive development.

Nevertheless, the implementation of the Triple Helix model is not without challenges. Aligning the objectives, expectations, and timelines of universities, industries, and government agencies can be complex and sometimes contentious. Bureaucratic hurdles, regulatory constraints, and differences in organizational cultures may impede effective collaboration. Sustaining funding and maintaining long-term commitment from all parties require continuous negotiation, trust-building, and adaptive governance. Addressing these challenges necessitates strong leadership, clear communication channels, and shared vision among stakeholders.

The significance of this study lies in its potential to provide empirical insights and practical recommendations for strengthening the Triple Helix partnership at UNY and beyond. By analyzing the experiences, successes, and challenges encountered in implementing this model, the research contributes to a deeper understanding of how universities can effectively collaborate with industries and government to develop research-based human resources.

Furthermore, the findings of this study have broader implications for policy-making, institutional strategy, and educational reform in Indonesia and other developing countries facing similar challenges in human capital development and innovation.

In summary, the introduction of the Triple Helix model into the partnership between UNY, industry, and government represents a strategic and forward-looking approach to addressing the pressing need for research-based, innovative, and adaptable human resources in Indonesia. It underscores the necessity of breaking down institutional silos and fostering a collaborative spirit that leverages the unique strengths of each actor. By embedding research into education and aligning academic programs with industrial and societal needs, the Triple Helix model not only enhances the employability and competencies of graduates but also contributes to the broader goals of national development and global competitiveness. The experiences of UNY in implementing this model offer valuable lessons and best practices for other higher education institutions seeking to play a more proactive and impactful role in shaping the future of their societies.

This introduction thus sets the stage for a comprehensive examination of how the Triple Helix partnership operates at UNY, the mechanisms through which it strengthens research-based human resources, the benefits it brings to each stakeholder, and the challenges that need to be addressed for its sustainability and effectiveness. In doing so, it contributes to the ongoing discourse on the role of universities in the 21st century as not merely transmitters of knowledge but as active agents of innovation, collaboration, and societal transformation through synergistic partnerships with industry and government.

## Method

This study adopts a qualitative research design with a case study approach to investigate the implementation of the Triple Helix model in the partnership between Universitas Negeri Yogyakarta (UNY), industry, and government for strengthening research-based human resources. A case study method was chosen because it allows an in-depth exploration of a contemporary phenomenon within its real-life context, particularly when the boundaries between the phenomenon and context are not clearly evident. The objective of this methodology is to uncover the mechanisms, dynamics, benefits, and challenges of the Triple Helix collaboration at UNY as an institutional model for human resource development.

The research was conducted at UNY and its partner institutions in Yogyakarta, Indonesia. The unit of analysis is the institutional partnership program between UNY, selected industrial partners, and relevant government agencies. To capture the complexity and multifaceted nature of the collaboration, data were collected from multiple sources, including official documents, interviews, observations, and secondary data from reports and publications. The triangulation of data sources was employed to enhance the validity and reliability of the findings.

## Data Collection Technique

First, document analysis was conducted to obtain a comprehensive understanding of the policies, agreements, and program designs that underpin the partnership. Key documents analyzed included memorandums of understanding (MoUs), strategic plans, research proposals, reports of joint projects, and government regulations that influence university-industry-government collaborations. These documents provided insight into the formal objectives, roles, and expected outcomes of the partnership.

Second, semi-structured interviews were conducted with key informants from the three spheres of the Triple Helix. At UNY, informants included senior administrators (e.g., rectorate members, deans, and directors of research and innovation), faculty members, and students who participated in collaborative programs. From the industry side, managers, human resource officers, and research and development (R&D) supervisors from partner companies were interviewed. On the government side, officials from the regional and national education, research, and manpower agencies participated. The interview guide was designed to elicit information about the motivations for participating in the partnership, the nature and extent of collaborative activities, perceived benefits and challenges, and suggestions for improvement.

Third, non-participant observation was employed to observe ongoing activities and interactions among the stakeholders. The

researcher attended selected meetings, workshops, and public events where UNY, industry, and government representatives interacted. This provided contextual and behavioral data that complemented the interview and document data. Field notes were systematically recorded to capture these observations.

Finally, secondary data were gathered from publications, news articles, and previous research to contextualize the findings and compare them with similar initiatives in other contexts. This helped situate the case of UNY within the broader discourse on the Triple Helix and research-based human resource development.

### **Sampling Strategy**

Purposive sampling was applied to select informants and documents that were directly relevant to the research objectives. The selection criteria for participants were based on their involvement in the design, implementation, or evaluation of the Triple Helix partnership programs. Efforts were made to ensure representation from all three sectors of the Triple Helix, and from different levels of responsibility and experience. A total of 25–30 informants were interviewed until data saturation was achieved, meaning that no new significant themes emerged from additional interviews.

### **Data Analysis Techniques**

The qualitative data were analyzed using thematic analysis. All interviews were recorded (with consent), transcribed verbatim, and checked for accuracy. The transcripts, along with field notes and documents, were imported into qualitative data analysis software (such as NVivo or Atlas.ti) to facilitate systematic coding and theme development. The analysis followed these steps: familiarization with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and writing up the findings.

Particular attention was paid to identifying themes related to the mechanisms of collaboration (e.g., joint research, curriculum alignment, internships), the benefits for each stakeholder (e.g., enhanced student competencies, improved industrial innovation, achievement of policy goals), and the challenges encountered (e.g., bureaucratic hurdles, funding sustainability, misaligned expectations). Patterns of interaction among the stakeholders, as well as factors that facilitated or hindered the success of the partnership, were also analyzed.

To ensure the trustworthiness of the research, several strategies were employed. Credibility was enhanced through data triangulation, member checking (where participants reviewed and confirmed the accuracy of the interpretations), and prolonged engagement in the field. Transferability was supported by providing a rich, thick description of the context and participants so that readers can assess the applicability of the findings to other settings. Dependability and confirmability were strengthened by maintaining an audit trail of all research decisions, data collection processes, and analysis procedures.

This study adhered to ethical research principles. Approval was obtained from the university's ethics review board before data collection began. All participants were informed about the purpose of the research, and their informed consent was obtained. They were assured of the confidentiality and anonymity of their responses, and they were informed of their right to withdraw from the study at any time without penalty. Data were stored securely and used solely for research purposes. While the qualitative case study approach offers depth and contextual richness, it also has limitations. The findings are context-specific and may not be generalizable to all universities or regions. There is also a potential for researcher bias in data interpretation, which was mitigated through reflexivity and peer debriefing. Additionally, the reliance on self-reported data from interviews means that findings may be influenced by participants' perceptions and social desirability. Nonetheless, by triangulating multiple data sources and employing rigorous analytical procedures, the study aims to provide credible and meaningful insights. This study employs a qualitative case study design to examine the implementation of the Triple Helix model at Universitas Negeri Yogyakarta in its collaboration with industry and government for research-based human resource development. Through document analysis, interviews, observations, and secondary data, the research uncovers the dynamics, benefits, and challenges of this partnership. The methodology is designed to capture the voices of diverse stakeholders, reveal the underlying mechanisms of collaboration, and provide practical recommendations for strengthening such

initiatives. The findings derived from this methodological approach contribute to both theoretical understanding and practical application of the Triple Helix model in higher education contexts.

## **Results & Discussion**

The findings of this study reveal the concrete manifestations, benefits, and challenges of the Triple Helix partnership implemented at Universitas Negeri Yogyakarta (UNY) in collaboration with industry and government to develop research-based human resources. The results are organized into three main themes: (1) mechanisms and forms of collaboration; (2) perceived benefits for each stakeholder; and (3) challenges and lessons learned from the implementation.

### **Mechanisms and Forms of Collaboration**

The study found that the Triple Helix partnership at UNY has evolved into an institutionalized and dynamic collaboration, materialized through several mechanisms. First, **joint research and development (R&D)** programs were identified as the central pillar of the partnership. UNY has established research centers and laboratories where faculty members, students, and industrial researchers work together on projects addressing real-world problems. For example, collaborative projects in renewable energy technology, education technology, and sustainable agriculture have produced prototypes and publications with industrial relevance.

Second, the **curriculum alignment and co-design** between UNY and its industrial partners, with government oversight, ensure that graduates possess competencies demanded by the labor market. Representatives from industries are involved in curriculum committees to advise on current trends, technological advancements, and skill requirements. The inclusion of industry-certified training modules and case-based teaching drawn from industrial contexts has enhanced the practical orientation of academic programs.

Third, **internship and apprenticeship programs** were extensively developed to provide students with hands-on experience in industrial settings. These programs, which range from three to twelve months, allow students to apply their academic knowledge in practice, gain exposure to workplace culture, and develop networks with potential employers.

Fourth, the establishment of a **technology transfer and innovation office (TTIO)** at UNY has facilitated the commercialization of research outputs and protected intellectual property generated from collaborative projects. The TTIO acts as a mediator to license technologies, create start-ups, and connect researchers with potential investors.

Finally, **policy facilitation and funding support** from the government have been instrumental in sustaining the partnership. Government agencies provide scholarships, research grants, tax incentives for companies participating in education and R&D, and regulatory frameworks that encourage university–industry engagement.

These mechanisms demonstrate how the Triple Helix model at UNY transcends traditional, siloed roles and fosters a mutually beneficial ecosystem for innovation and human resource development.

### **Perceived Benefits for Each Stakeholder**

The research identified substantial benefits experienced by each of the three actors in the partnership.

For **UNY**, the collaboration has significantly enhanced the relevance and impact of its educational and research missions. Faculty members gain opportunities to engage in applied research, access additional funding, and build professional networks. Students benefit from improved employability due to their exposure to industrial practices, research experiences, and soft-skill development. The university's reputation has also improved as it demonstrates responsiveness to societal and industrial needs.

For **industry**, the partnership provides access to a skilled and innovative talent pipeline. Companies participating in the program reported that they could recruit graduates who were better prepared to contribute immediately to their operations. Additionally, industrial partners benefit from cost-effective R&D conducted jointly with university researchers and from intellectual property developed through the collaboration. The partnership also enables companies to fulfill their corporate social responsibility goals by supporting education and community development initiatives.

For the **government**, the Triple Helix partnership serves as an effective policy instrument to achieve national objectives related to workforce competitiveness, technological advancement, and economic development. By supporting these collaborations, government agencies can ensure that higher education institutions contribute to regional and national development agendas. Moreover, the partnership fosters inclusive growth by aligning educational outcomes with labor market demands and facilitating technology dissemination.

These findings support previous research that highlights the Triple Helix as a catalyst for innovation-driven development by aligning the goals and leveraging the resources of universities, industries, and government.

### **Challenges and Lessons Learned**

Despite its successes, the implementation of the Triple Helix model at UNY is not without challenges. A recurring theme in the data is the **misalignment of expectations and objectives** among stakeholders. For instance, universities prioritize long-term knowledge generation and publication, while industries often seek immediate, market-oriented solutions. This difference sometimes leads to tensions in setting research agendas and timelines.

Another significant challenge is the **bureaucratic and regulatory hurdles** that slow down decision-making and limit flexibility. Both university and government procedures were perceived as cumbersome by industrial partners, who preferred more agile and responsive processes. Additionally, the **sustainability of funding** remains a concern, particularly for research-intensive projects that require continuous investment beyond initial grants.

Cultural differences between academic and corporate environments also emerged as a barrier. While academia values openness and dissemination of knowledge, industries emphasize confidentiality and competitive advantage. Building trust and establishing clear agreements regarding intellectual property rights are therefore critical.

Furthermore, the study revealed a **need for stronger governance structures and communication channels** to coordinate activities, monitor progress, and resolve conflicts. Although UNY has made strides in establishing institutional frameworks, further efforts are needed to streamline collaboration and ensure stakeholder engagement at all levels.

From these challenges, several lessons can be drawn. First, the importance of **shared vision and trust** cannot be overstated. Regular dialogue, transparency in decision-making, and recognition of each stakeholder's contributions are essential to sustaining the partnership. Second, **capacity building** for faculty, students, and industry practitioners in collaborative research and innovation management enhances the effectiveness of the partnership. Third, establishing flexible, adaptive policies that can accommodate the dynamic nature of innovation and industry needs is crucial for long-term success.

### **Discussion: Implications and Contributions**

The results of this study have several important implications for theory, practice, and policy. From a theoretical perspective, the findings support and extend the Triple Helix model by illustrating how it operates in a developing country context, where institutional capacities and innovation systems are still evolving. The study contributes to the literature by showing how universities like UNY can move beyond their traditional teaching roles to act as entrepreneurial and socially-engaged institutions.

Practically, the study provides a roadmap for other higher education institutions seeking to implement similar partnerships. The specific mechanisms identified—joint research, curriculum alignment, internships, technology transfer, and policy facilitation—serve as concrete examples of how to operationalize the Triple Helix. Recognizing and addressing the challenges identified in this study can help other universities anticipate potential pitfalls and design more resilient partnerships.

For policymakers, the findings highlight the importance of creating an enabling environment for university–industry–government collaboration. This includes simplifying administrative processes, offering financial and regulatory incentives, and fostering a culture of innovation and risk-taking. Policy frameworks should

recognize the hybrid and dynamic nature of the Triple Helix, allowing flexibility and encouraging experimentation at the institutional level.

Moreover, this study underscores the value of embedding research-based learning into higher education curricula. By engaging students in real-world, research-driven projects, the university not only equips them with technical and soft skills but also instills an innovative and problem-solving mindset that is crucial in the modern workforce.

Comparing the findings to previous studies, it is evident that the Triple Helix model is adaptable to diverse socio-economic contexts but requires contextualization. While the model originated in developed countries with mature innovation systems, its application at UNY shows that even in resource-constrained environments, significant progress can be made through commitment, creativity, and stakeholder alignment.

The findings of this study demonstrate that the Triple Helix partnership at UNY has successfully fostered a collaborative ecosystem where universities, industry, and government jointly contribute to research-based human resource development. Through various mechanisms—such as joint research, curriculum co-design, internships, and technology transfer—the partnership has produced tangible benefits for all stakeholders, including improved graduate employability, enhanced industrial innovation, and achievement of policy goals. However, challenges related to misaligned expectations, bureaucratic inertia, funding sustainability, and cultural differences highlight the need for continuous improvement, adaptive governance, and trust-building. The lessons learned from UNY's experience offer valuable insights for other institutions and policymakers aiming to harness the potential of university–industry–government collaboration in strengthening human capital and fostering innovation. The study reaffirms the relevance of the Triple Helix model as a strategic approach to aligning education, research, and economic development, particularly in contexts where human resources and innovation are critical to achieving sustainable growth. The success of such partnerships depends not only on institutional commitment and policy support but also on the willingness of all actors to collaborate, adapt, and innovate together.

### **Conclusion**

This study examined the implementation of the Triple Helix model at Universitas Negeri Yogyakarta (UNY) as a collaborative framework between university, industry, and government to strengthen research-based human resources. The findings demonstrate that the Triple Helix partnership has successfully fostered a dynamic and synergistic ecosystem where each stakeholder contributes its unique resources, expertise, and mandates to achieve shared objectives. Through mechanisms such as joint research projects, curriculum co-design, student internships, technology transfer initiatives, and policy facilitation, UNY has been able to align its educational and research missions with industrial needs and national development priorities. The Triple Helix model at UNY has produced tangible benefits for all parties involved. For the university, it has enhanced the relevance and societal impact of academic programs, improved research output, and increased graduate employability. Faculty members and students gained valuable opportunities to engage in real-world, research-driven projects that foster innovation, critical thinking, and practical skills. For industries, the collaboration provided access to a pipeline of skilled and research-oriented talent, cost-effective R&D support, and innovative solutions tailored to their operational needs. Meanwhile, the government benefited from the achievement of workforce development and innovation goals that align with broader socio-economic agendas. The study also identified several challenges that can impede the effectiveness of such collaborations. Misaligned expectations between academia and industry, bureaucratic rigidity, funding sustainability, and cultural differences regarding knowledge sharing and intellectual property were among the key obstacles observed. These challenges highlight the importance of building trust, maintaining open and frequent communication, establishing clear agreements, and fostering a shared vision to ensure the sustainability and effectiveness of the partnership. Theoretically, this research reaffirms the applicability of the Triple Helix model in a developing country context, demonstrating its potential to strengthen innovation systems and human capital even in environments with limited resources and institutional capacity. Practically, the experience of UNY offers a replicable model and valuable lessons for other higher education institutions seeking to

enhance their impact on human resource development and industrial innovation through collaborative strategies.masyarakat.