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University Technology Transfer Offices in Iran: Institutional Structures and Manifestations within the National Innovation System – A Case Study of Persian Gulf University

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Abstract

University Technology Transfer Offices (TTOs) have emerged as pivotal institutional intermediaries in national innovation systems, facilitating dynamic linkages between academia and industry while supporting the commercialization of research outputs. This study examines the organizational structure and institutional manifestations of TTOs in Iran, with a focus on the case of Persian Gulf University. Using a conceptual framework that categorizes TTO functions into core, developmental, supportive, and networking dimensions, the study employed a qualitative design, drawing on document analysis, official reports, and semi-structured interviews with key stakeholders. Comparative analysis was conducted with international experiences, particularly the Italian NetVal network. Findings reveal that while the TTO at Persian Gulf University has made progress in training, patent registration, and industry outreach, it faces structural challenges in governance, professional human resources, financial sustainability, and networking capacity. The Italian case underscores the necessity of coherent national policies, specialized intermediary institutions, transparent standards, and continuous structural and legal support to ensure the effectiveness of TTOs. The study concludes with policy recommendations to strengthen governance infrastructures, develop legal and financial instruments, and enhance the networking role of TTOs within Iran's innovation ecosystem.

Keywords: Academic Entrepreneurship; Institutional Manifestations; National Innovation System; Technology Transfer Offices; University–Industry Relations.

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Introduction

In recent decades, universities worldwide have moved beyond their traditional missions of education and research to become central actors in national and regional innovation systems. A key mechanism enabling this transformation is the commercialization of academic research, which translates scientific outputs into marketable products, services, and processes. Technology Transfer Offices (TTOs) have become institutionalized intermediaries in this process, serving as catalysts for bridging academia and industry, managing intellectual property rights, and facilitating entrepreneurial activities. In Iran, the expansion of TTOs began during the Fourth and Fifth National Development Plans, when policymakers sought to institutionalize mechanisms for knowledge transfer and commercialization. Despite significant quantitative growth in the number of TTOs across public universities, qualitative challenges persist. Many TTOs face shortages of specialized staff, lack sustainable financial resources, and operate without robust monitoring and evaluation systems. These shortcomings hinder their ability to fulfill the broad operational dimensions defined in international literature, including patenting, licensing, entrepreneurship support, and industry collaboration.The present study aims to analyze the institutional structures and manifestations of university TTOs in Iran, focusing on the case of the Persian Gulf University. Specifically, the study develops and applies a conceptual framework for evaluating the structural and functional dimensions of TTOs, while providing a comparative perspective with international best practices—most notably, the Italian NetVal association of university TTOs. This study addresses two central questions: What are the core structural and operational dimensions of TTOs as identified in international (e.g., AUTM, OECD) and domestic literature? How are these institutional manifestations realized within the TTO (Intellectual Property Office) at the Persian Gulf University?

The literature on academic commercialization identifies three main approaches: the **value-chain approach** (emphasizing linear processes from idea generation to market introduction), the **transfer approach** (emphasizing the role of intermediaries such as TTOs), and the **stage-based approach** (focusing on the final stages of product development and market readiness). Within the broader **Triple Helix model** of university–industry–government relations (Etzkowitz & Leydesdorff, 2000), TTOs are recognized as vital intermediaries that enable dynamic, multi-actor interactions. International experiences, particularly in Europe and the United States, show that effective TTOs are not merely administrative units but specialized institutions with distinct organizational capacities, professional staff, and stable policy support. The Italian NetVal case illustrates how a coordinated national platform can standardize practices, enhance collaboration, and significantly expand the creation of academic spin-offs. In Iran, however, despite policy support and numerical growth, TTOs remain fragmented, under-resourced, and often symbolic in nature. The lack of integrated analytical frameworks and systematic evaluations further limits their effectiveness. Addressing these gaps requires both empirical analysis of individual cases and comparative assessments that contextualize Iranian TTOs within global innovation systems.

Methodology

This study adopts a qualitative research design with an explanatory–analytical orientation, aiming to explore the institutional structures and functional dimensions of university TTOs in Iran through a case study of the Persian Gulf University. The **case study approach** was selected, as it allows for in-depth analysis of complex organizational phenomena within their real-world context (Yin, 2014). This strategy is particularly suited for examining how TTOs operate at the intersection of academic, industrial, and policy environments. A triangulated data collection strategy was employed:

Documentary Analysis: National policy documents, legal frameworks, and official reports from the Ministry of Science, Research, and Technology; international reports from AUTM and OECD; and academic publications on technology transfer were analyzed to build the conceptual framework. **Comparative Case Analysis:** International experiences, particularly the Italian NetVal association of university TTOs, were reviewed to provide comparative insights. **Semi-Structured Interviews:** Seven key informants—including the Vice President for Technology and Innovation, the Director of the TTO, intellectual property specialists, and staff responsible for marketing and evaluation—were purposively selected. Interviews were conducted using a guided protocol based on the conceptual framework, covering themes such as governance, intellectual property management, networking, and financial sustainability.

The collected data were analyzed through **qualitative content analysis** (Elo & Kyngäs, 2008) with a **deductive coding** strategy informed by the conceptual framework. Coding was conducted in three stages: open, axial, and selective. Data were organized into four main categories of TTO functions—core, developmental, supportive, and networking. NVivo-assisted manual coding ensured consistency and traceability.Several measures were taken to ensure research rigor: **Triangulation** of multiple data sources (documents, interviews, international comparisons). **Theoretical saturation** was achieved after seven interviews, as no new themes emerged. **Member checking** was conducted by sharing synthesized findings with participants for validation. **Audit trail** documentation was maintained to enhance transparency and replicability. By combining documentary evidence, field interviews, and comparative international experiences, the methodology provided a robust foundation for analyzing both the structural challenges and institutional manifestations of TTOs in Iran.

Findings

The analysis of the Persian Gulf University Technology Transfer Office (TTO), formally operating as the Intellectual Property Office within the Persian Gulf Science and Technology Park, highlights both achievements and persistent challenges across four main functional dimensions: core, developmental, supportive, and networking. The TTO actively supports the documentation, evaluation, and registration of patents by faculty members and researchers. It has contributed to protecting the university's intellectual assets and facilitated preliminary commercialization steps. However, due to systemic weaknesses in Iran's intellectual property regime—such as lengthy patent registration processes and lack of harmonized legal frameworks—these efforts have not reached full maturity. As a result, patent protection remains incomplete and inefficient. The TTO organizes workshops and provides advisory services on patenting, licensing, and entrepreneurship. On average, it delivers more than 25 training sessions annually and offers over 300 hours of free consultation to faculty, students, and start-ups. These activities have contributed to a gradual diffusion of entrepreneurial culture within the university. Nevertheless, the translation of such training into tangible commercialization outcomes is limited, partly due to misaligned academic incentives prioritizing publication and promotion over industry collaboration. The TTO has attempted to foster connections between the university, industry, and regional stakeholders. Yet, the results remain modest. Weak trust between academia and industry, the predominance of traditional academic career incentives, and limited regional industrial demand have constrained the TTO's ability to establish effective collaborative networks. While co-location within the Science and Technology Park has facilitated some contacts, a systemic culture of collaboration is still lacking. The office has only partially engaged in market research and the systematic marketing of university-generated technologies. The absence of dedicated market analysts and insufficient

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prioritization of this function has meant that many patents and inventions remain disconnected from industrial demand. This gap reflects a broader challenge in aligning research outputs with market needs.

The TTO has provided direct financial assistance to bridge the funding gap between laboratory research and commercialization. For instance, it has granted loans and subsidies of up to 400 million IRR for promising projects, covering prototype development and feasibility studies. Although limited in scale, these measures have increased motivation among inventors and reduced early-stage risks. However, constrained resources prevent broad coverage of all potential commercialization projects. The TTO plays a supportive role in fostering academic spin-offs. It assists researchers in navigating administrative processes, securing initial resources, and linking with the Science and Technology Park's incubators. These interventions have enabled the creation of several start-ups. Yet, the lack of comprehensive incubation services—such as professional mentorship, venture financing, and global market access—limits the growth potential of these firms. Despite some efforts, the TTO has not significantly influenced broader cultural perceptions or policy incentives for technology transfer. Both faculty and industry representatives exhibit limited awareness and trust in university-driven commercialization. Without national-level incentives and legal frameworks, the TTO's efforts in advocacy and promotion remain largely symbolic. Comparison with Italy's NetVal association reveals key differences. NetVal provides a national platform for standardization, resource sharing, and spin-off support, which has resulted in the creation of over 100 spin-offs annually. In contrast, Iranian TTOs such as that of Persian Gulf University operate in isolation, lack standardized procedures, and face systemic barriers. This underscores the importance of coordinated national support, intermediary organizations, and harmonized policies.

Conclusion

This study demonstrates that while the Persian Gulf University Technology Transfer Office (TTO) has taken commendable steps in supporting patenting, offering training, and facilitating initial spin-off creation, it remains constrained by systemic and structural challenges. Four major conclusions emerge: **Governance and Institutional Capacity:** The TTO lacks a well-defined governance model, professional human resources, and clear performance evaluation mechanisms. Its integration within the Science and Technology Park has improved access to infrastructure, but institutional fragility persists. **Alignment with National Policies:** Comparative analysis with Italy's NetVal highlights that the effectiveness of university TTOs depends on coherent national policies, legal clarity, and standardized operational frameworks. Without harmonized policies and supportive intermediary institutions, Iranian TTOs struggle to achieve sustainability. **Financial and Networking Limitations:** Although the TTO provides limited financial support to researchers, the scale is insufficient to cover the wide commercialization gap. Weak trust between academia and industry further constrains network formation and collaborative innovation. **Cultural and Incentive Challenges:** Deep-rooted academic norms that prioritize publications over industry collaboration remain a significant barrier. Without reforms in academic promotion criteria and stronger policy incentives, commercialization will continue to be undervalued within the university system.

To enhance the effectiveness of TTOs in Iran, the following strategies are proposed: Strengthening governance infrastructures through standardized procedures, professional training, and robust evaluation systems. Establishing national intermediary networks, modeled on Italy's NetVal, to support resource sharing and capacity-building. Developing innovative legal and financial instruments (e.g., venture capital funds, licensing frameworks) to address early-stage

commercialization barriers. Reforming academic incentive structures to reward technology transfer, entrepreneurship, and industry engagement alongside publications. Promoting a culture of trust and collaboration between universities and industries through long-term policy initiatives and advocacy programs.

By implementing these measures, TTOs can move beyond symbolic functions and evolve into effective institutional actors that foster university–industry–government collaboration, thereby contributing to Iran's transition toward a more knowledge-based economy.

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