

Patent Portfolio Management in Utility Organizations: An Innovation-to-Value Framework for Transforming Invention Disclosures into Strategic Organizational Assets

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Abstract: Patent portfolio management has evolved beyond the traditional role of intellectual property protection and increasingly serves as a strategic mechanism for supporting innovation, organizational competitiveness, and value creation. Despite growing investments in research and development, many utility organizations continue to face challenges in systematically transforming invention disclosures into measurable organizational outcomes. Existing literature predominantly focuses on patent protection, valuation, and commercialization as independent domains, while limited attention has been given to an end-to-end management framework that connects invention generation, intellectual property protection, portfolio optimization, and strategic value realization. This paper proposes an Innovation-to-Value Patent Management Framework (IVPMF) designed specifically for innovation-intensive utility organizations. Drawing upon more than seven years of professional experience in intellectual property portfolio management, innovation governance, patent strategy, and technology transfer, the framework demonstrates how organizations can transition from reactive patent filing practices toward proactive portfolio management approaches that align innovation activities with organizational objectives. The proposed framework consists of nine interconnected stages: opportunity identification, invention disclosure, technical validation, prior-art intelligence, patentability assessment, strategic portfolio prioritization, protection strategy, commercialization readiness, and strategic value creation. The framework is supported by practitioner observations derived from the management of more than one hundred patentability assessments, fifty to sixty patent filings, twenty granted patents, and twenty-three commercialization support and internal deployment pathways across multiple technology domains. The findings suggest that organizations can significantly improve innovation outcomes when patent portfolio management is integrated into broader innovation governance structures rather than treated as an isolated legal function.

Keywords: Patent Portfolio Management; Innovation Management; Intellectual Property Management; Technology Transfer; Utility Innovation; Knowledge Management; Innovation Governance; Strategic Value Creation; Patent Strategy; Commercialization.

1. Introduction

Innovation has become a critical determinant of organizational competitiveness, particularly within utility organizations operating in increasingly dynamic technological, environmental, and regulatory environments. Historically, utility organizations focused primarily on operational reliability, infrastructure management, and service continuity. However, the global transition toward digitalization, sustainability, decarbonization, smart infrastructure, artificial intelligence, and advanced energy technologies has significantly increased the importance of research, development, and innovation activities within the sector.

As innovation activities expand, organizations generate increasing volumes of intellectual assets in the form of inventions, technical know-how, proprietary methodologies, software solutions, and emerging technologies. Intellectual property protection, particularly through patents, plays a fundamental role in safeguarding these innovations and enabling organizations to maintain competitive advantages while maximizing returns on research and development investments.

Despite growing awareness of intellectual property importance, many organizations continue to view patent management primarily as a legal or administrative activity focused on filing applications and securing protection rights. Such an approach often results in fragmented decision-making processes, inefficient allocation of resources, underutilized patent portfolios, and limited connections between innovation activities and strategic organizational objectives.

The limitations of traditional patent management approaches have led scholars and practitioners to advocate for more strategic portfolio management models. Rather than evaluating inventions individually, organizations are increasingly encouraged to manage intellectual property as a portfolio of strategic assets capable of supporting technology leadership, competitive positioning, commercialization opportunities, partnerships, and long-term organizational growth.

Within utility organizations, this challenge becomes particularly significant due to the multidisciplinary nature of innovation activities. Research initiatives frequently span renewable energy systems, advanced materials, smart grids, digital technologies, artificial intelligence applications, water technologies, automation systems, and

sustainability solutions. Managing such diverse innovation outputs requires structured processes capable of balancing technical merit, commercial potential, strategic relevance, and resource constraints.

Furthermore, innovation success is not determined solely by the number of patents filed or granted. The true value of intellectual property emerges when inventions contribute to organizational objectives through commercialization, technology deployment, strategic partnerships, operational improvements, knowledge creation, or competitive differentiation. Organizations therefore require mechanisms that connect invention generation with value realization throughout the innovation lifecycle.

While extensive literature exists regarding patent valuation, patent strategy, technology transfer, and innovation management, relatively limited attention has been devoted to developing integrated frameworks that connect invention disclosure management, patent portfolio governance, commercialization readiness, and strategic value creation within utility-sector environments. This gap creates a need for practical and transferable approaches capable of supporting innovation-intensive organizations.

This paper addresses this challenge through the development of the Innovation-to-Value Patent Management Framework (IVPMF). The framework proposes a structured pathway through which organizations can systematically transform invention disclosures into strategic organizational assets while aligning intellectual property activities with broader innovation objectives. It draws upon practitioner experience accumulated through intellectual property portfolio management, patentability assessments, invention disclosure evaluation, portfolio strategy development, technology transfer support, and commercialization readiness activities.

The remainder of this paper is organized as follows. Section II reviews relevant literature on patent portfolio management, innovation governance, and technology transfer. Section III outlines the methodology used to develop the framework. Section IV introduces the Innovation-to-Value Patent Management Framework and its supporting figures. Section V discusses practical implementation insights and organizational implications. Section VI presents conclusions and recommendations for future research and practice.

2. Literature Review

2.1 Evolution of Patent Portfolio Management

Intellectual property has become an increasingly important organizational asset within knowledge-intensive industries. Historically, patent management was viewed as a legal function focused on securing exclusive rights to inventions and protecting technological developments from unauthorized use. Early practices emphasized patent filing volumes, geographical coverage, and legal enforceability as the primary indicators of success.

Over time, however, organizations recognized that patents represent more than legal instruments. Patents embody codified organizational knowledge, technological capabilities, and innovation outcomes that can influence competitive positioning, market access, collaboration opportunities, and long-term organizational performance. As a result, patent portfolio management has evolved into a strategic management discipline that integrates intellectual property considerations into broader business and innovation strategies.

Granstrand (1999) argued that intellectual property portfolios should be managed as strategic assets that contribute to value creation rather than as isolated legal protections. Similarly, Teece (1986) highlighted the importance of complementary assets and organizational capabilities in transforming technological innovations into economic value. More recent open innovation research has reinforced this shift by showing that intellectual property decisions increasingly operate within broader innovation ecosystems, collaboration models, and knowledge flows rather than within purely legal boundaries (Gassmann et al., 2010; Bogers et al., 2018). These perspectives collectively move attention from individual patents toward the management of patent portfolios as interconnected collections of innovation assets.

Modern patent portfolio management therefore encompasses invention disclosure management, patentability assessment, portfolio optimization, filing strategy development, patent valuation, commercialization support, technology transfer, and portfolio governance. It is also increasingly informed by patent analytics and evidence on patent quality, citation impact, and strategic positioning (Hall et al., 2005; World Intellectual Property Organization [WIPO], 2024). Organizations seeking to maximize returns on research and development investments must ensure that patent activities align with strategic objectives rather than operate independently from innovation management functions.

2.2 Intellectual Property as a Strategic Asset

The resource-based view of the firm (Barney, 1991) suggests that sustainable competitive advantage arises from valuable, rare, difficult-to-imitate, and non-substitutable resources. Intellectual property often satisfies these criteria because it protects unique technological capabilities while creating barriers to imitation. Subsequent research has further shown that well-managed intellectual property portfolios contribute to reputation, bargaining power, market signaling, and innovation positioning, especially in environments characterized by collaboration and open innovation (Reitzig, 2004; Hall et al., 2005; Bogers et al., 2018).

Reitzig (2004) proposed that patents provide value through multiple pathways, including exclusion of competitors, licensing opportunities, negotiation leverage, and signaling effects. More recent global evidence also indicates that intellectual property is increasingly embedded in national and organizational innovation strategies, making portfolio quality and strategic coherence as important as filing volume (WIPO, 2024). Within utility organizations, this strategic role is especially significant because innovation activities often require high capital investment, long development cycles, infrastructure integration, and multidisciplinary collaboration.

2.3 Innovation Management and Value Creation

Innovation management literature emphasizes the systematic transformation of ideas into valuable outcomes. Innovation processes generally involve idea generation, evaluation, development, implementation, and value realization. Schumpeter (1934) highlighted the role of new combinations of knowledge, technologies, and resources in driving economic development. Contemporary scholars such as Tidd and Bessant (2020) and Trott (2021) describe innovation management as the process of organizing resources, learning mechanisms, and capabilities to create and capture value from innovation activities, while the OECD (2018) provides an updated policy-oriented definition of innovation that includes both products and business processes.

Utility organizations face unique innovation challenges because they must simultaneously pursue operational reliability, sustainability objectives, technological modernization, regulatory compliance, and customer expectations. Patent portfolio management can therefore play a critical role within innovation management systems by supporting decision-making, protecting innovation outputs, and facilitating value realization. Nevertheless, many organizations continue to manage innovation and intellectual property as separate functions, limiting opportunities for knowledge integration and reducing the strategic benefits that can be derived from coordinated innovation governance (Tidd & Bessant, 2020; Trott, 2021).

2.4 Technology Transfer and Commercialization

Technology transfer refers to the movement of knowledge, technologies, capabilities, or innovations from one context to another for practical application and value creation. Bozeman (2000) argued that technology transfer effectiveness should be evaluated based on outcomes rather than transfer activities alone. Later work by Bozeman et al. (2015) further demonstrated that technology transfer should be assessed through contingent effectiveness, public value, and organizational context rather than by narrow commercialization metrics alone. Multiple pathways therefore exist through which innovations generate value, including licensing, partnerships, joint ventures, spin-offs, internal deployment, and commercialization initiatives.

Within utility organizations, commercialization may occur through multiple mechanisms. Some innovations generate value through external partnerships or licensing arrangements, while others create value through internal deployment, operational improvements, cost reduction, sustainability enhancement, or service optimization. Technology transfer and commercialization readiness should therefore be viewed as integral components of patent portfolio management rather than downstream activities separated from portfolio decision-making (Bozeman, 2000; Bozeman et al., 2015).

2.5 Knowledge Management and Intellectual Capital

Nonaka and Takeuchi (1995) describe knowledge creation as a dynamic process involving interaction between tacit and explicit knowledge. Patent documentation represents a form of knowledge codification that transforms technical expertise into protected organizational assets. More recent work has further highlighted the bidirectional relationship between knowledge management and intellectual capital, showing that organizations create stronger innovation outcomes when knowledge capture, codification, and reuse are systematically linked to strategic capabilities (Garcia-Perez et al., 2020). Organizations that effectively manage intellectual capital are

therefore better positioned to preserve technical knowledge, support organizational learning, and facilitate knowledge sharing across boundaries.

2.6 Innovation Governance and Portfolio Decision-making

Cooper et al. (2001) emphasize that portfolio management enables organizations to prioritize projects, allocate resources effectively, and maintain strategic balance. Similar principles apply to patent portfolios, where organizations must determine which inventions justify protection, commercialization efforts, or additional investment. Recent innovation management literature also stresses that portfolio decisions should connect governance, learning, risk, and value creation rather than rely solely on technical screening (Tidd & Bessant, 2020; Trott, 2021). Strategic portfolio governance therefore requires evaluation criteria that extend beyond technical novelty; commercial potential, strategic relevance, competitive positioning, implementation feasibility, and long-term organizational impact must all be considered.

2.7 Research Gap

Although substantial literature exists on patent strategy, innovation management, technology transfer, commercialization, and knowledge management, these domains are frequently examined independently. Existing research rarely provides a unified framework that connects invention disclosure management, patentability assessment, portfolio governance, commercialization readiness, and strategic value creation within a single innovation lifecycle model, particularly in utility-sector settings. Current studies on open innovation, knowledge integration, and portfolio governance provide valuable insights (Bogers et al., 2018; Garcia-Perez et al., 2020), yet they do not offer an end-to-end practitioner-oriented framework tailored to infrastructure-intensive utility environments. The literature therefore reveals a need for a practical and transferable framework, which forms the foundation of the Innovation-to-Value Patent Management Framework proposed in this paper.

3. Methodology

3.1 Research Approach

This paper adopts a practitioner-based qualitative research approach to develop a practical framework for patent portfolio management within innovation-intensive utility organizations. The study is grounded in professional experience accumulated through more than seven years of involvement in intellectual property portfolio management, patent strategy development, innovation governance, technology transfer support, and commercialization readiness activities. Practitioner-based qualitative inquiry is appropriate when the purpose is to interpret processes, identify recurring patterns, and develop analytically transferable insights from real-world contexts (Creswell & Poth, 2018; Yin, 2018). The objective is not to evaluate a specific organization's performance, but to identify recurring practices, governance mechanisms, and decision pathways that can be generalized into a transferable management framework.

3.2 Data Sources

The framework was developed through observations derived from professional involvement in:

- Management of more than 100 patentability assessments.
- Support of approximately 50–60 patent filings.
- Contribution to approximately 20 granted patents.
- Support of 23 commercialization and internal deployment pathways.
- Invention disclosure management activities.
- Prior-art intelligence and patent landscape assessments.
- Patent prosecution support and filing strategy development.
- Portfolio analytics, reporting, and technology transfer support activities.
- Innovation awareness and inventor engagement programs.

The experience covered multiple technology domains including digital technologies, sustainability-related innovations, advanced engineering systems, artificial intelligence applications, smart infrastructure solutions, and emerging technology platforms.

3.3 Framework Development Process

The proposed Innovation-to-Value Patent Management Framework was developed through three stages. First, patent portfolio management activities were reviewed to identify common processes occurring throughout the innovation lifecycle, consistent with qualitative framework development approaches that move from patterned observation to conceptual synthesis (Creswell & Poth, 2018). Second, the identified activities were grouped according to their contribution to innovation progression, intellectual property protection, portfolio optimization, and value creation. Third, the activities were synthesized into a nine-stage framework representing the progression from invention generation to strategic organizational value creation, reflecting the portfolio logic emphasized in innovation governance literature (Cooper et al., 2001; Tidd & Bessant, 2020).

3.4 Limitations

The framework is based primarily on practitioner observations and therefore reflects experiences within innovation-intensive utility environments. While the framework is intended to be transferable across industries, future empirical studies may further validate its applicability within alternative organizational contexts. No confidential organizational information is disclosed in this paper.

4. The Innovation-to-Value Patent Management Framework (IVPMF)

4.1 Framework Overview

The Innovation-to-Value Patent Management Framework (IVPMF) proposes that patent portfolio management should be viewed as a strategic innovation process rather than a legal protection process. The framework integrates innovation management, intellectual property management, technology transfer, commercialization readiness, and portfolio governance into a single lifecycle model consisting of nine interconnected stages. This integrative view is consistent with research emphasizing the strategic coordination of innovation portfolios, knowledge flows, and value capture mechanisms rather than isolated legal or administrative actions (Tidd & Bessant, 2020; Trott, 2021). Figure 1 illustrates the overall framework.



Figure 1: Innovation-to-Value Patent Management Framework (IVPMF).

4.2 Stage 1: Opportunity Identification

Innovation opportunities originate from multiple sources including research activities, operational challenges, emerging technologies, sustainability objectives, customer needs, and strategic priorities. Organizations that

actively identify innovation opportunities create stronger pipelines of invention disclosures and improve portfolio quality. Opportunity identification should therefore be considered the starting point of patent portfolio management rather than an activity external to the process.

4.3 Stage 2: Invention Disclosure

The invention disclosure stage serves as the formal entry point into the intellectual property management process. Effective disclosure systems encourage inventors to document innovation outputs while providing sufficient technical detail for evaluation. Organizations should establish structured disclosure mechanisms capable of capturing technical, strategic, and commercial information.

4.4 Stage 3: Technical Validation

Technical validation assesses whether an invention is technically feasible and sufficiently mature for intellectual property evaluation. This stage typically involves inventor interviews, technical reviews, feasibility assessments, and clarification of innovation objectives. Technical validation reduces uncertainty and improves decision-making quality during subsequent stages.

4.5 Stage 4: Prior-Art Intelligence

Prior-art intelligence extends beyond traditional novelty searches. This stage incorporates patent landscapes, technology scouting, competitor intelligence, and research trend analysis. It contributes to novelty assessment, identification of technology gaps, strategic positioning, competitive awareness, and future research direction.

4.6 Stage 5: Patentability Assessment

Patentability assessment evaluates inventions according to established intellectual property criteria including novelty, inventive step, and industrial applicability. However, the proposed framework argues that patentability should not be evaluated solely from a legal perspective, strategic considerations should also influence assessment decisions.

4.7 Stage 6: Strategic Portfolio Prioritization

Strategic portfolio prioritization represents one of the most important contributions of the proposed framework. Many organizations focus exclusively on patentability while neglecting strategic portfolio considerations. This stage evaluates inventions according to strategic alignment, commercial potential, technology maturity, organizational impact, resource requirements, and competitive positioning.

4.8 Stage 7: Protection Strategy

Protection strategy determines how intellectual property rights will be secured and maintained. Key considerations include jurisdiction selection, filing route selection, budget allocation, portfolio balance, and technology lifecycle. Organizations should avoid applying identical filing approaches to all inventions; instead, protection strategies should reflect strategic objectives and portfolio priorities.

4.9 Stage 8: Commercialization Readiness

Commercialization readiness assesses the organization's ability to transform protected innovations into practical value. Potential pathways include internal deployment, licensing, strategic partnerships, technology transfer, operational integration, and future commercialization opportunities. Commercialization readiness should be evaluated before protection decisions are finalized whenever possible.

4.10 Stage 9: Strategic Value Creation

The final stage focuses on value realization. Value creation may occur through revenue generation, cost reduction, operational improvement, sustainability enhancement, strategic partnerships, competitive advantage, knowledge transfer, and organizational reputation. The framework emphasizes that patents achieve their greatest value when integrated into broader innovation ecosystems rather than remaining isolated legal assets.

4.11 Strategic Patent Decision Matrix

Figure 2 presents a strategic decision matrix that supports prioritization decisions for invention disclosures and patent assets. The matrix evaluates inventions along two dimensions: strategic value and commercial potential. The resulting quadrants guide appropriate management actions, ranging from accelerated commercialization to limited protection or strategic abandonment.

Table 1: Strategic Patent Decision Matrix.

	Commercial Potential	
	High	Low
Strategic Value High	Accelerate & Commercialize	Strategic Protection & Monitoring
Strategic Value Low	Selective Commercialization	Limited Protection or Abandonment

4.12 Utility Intellectual Property Maturity Model

Figure 3 introduces a five-level intellectual property maturity model designed to help utility organizations benchmark their current capabilities and progress toward innovation-driven intellectual property management.

Table 2: Utility Intellectual Property Maturity Model.

Level 1 Reactive	Level 2 Structured	Level 3 Managed	Level 4 Strategic	Level 5 Innovation-Driven
Patent filing occurs only when requested.	Basic invention disclosure and filing procedures established.	Portfolio reviews and patentability assessments integrated.	IP portfolio aligned with organizational innovation strategy.	IP actively supports commercialization and value creation.

4.13 Patent Portfolio Optimization Model

Figure 4 presents the portfolio optimization model that supports continuous improvement of intellectual property assets. The model emphasizes feedback between strategic impact and the upstream innovation pipeline.

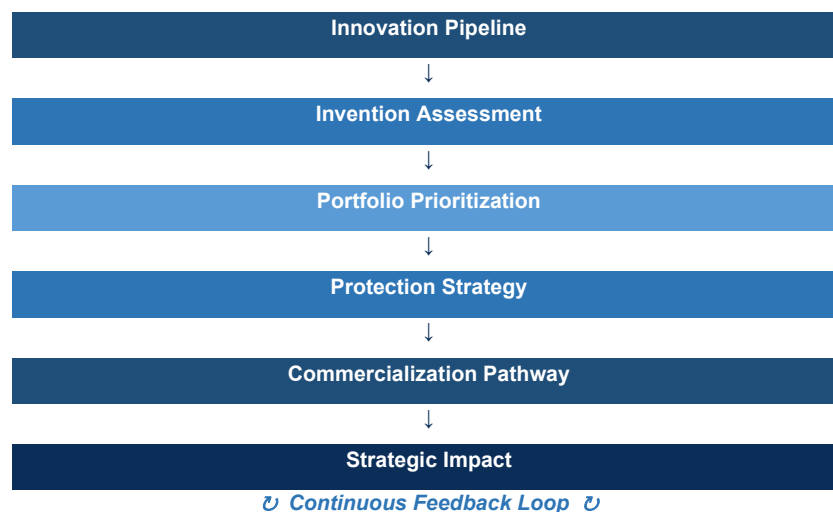


Figure 2: Patent Portfolio Optimization Model.

5. Discussion

5.1 Reframing Patent Portfolio Management as an Innovation Governance Function

A central contribution of the IVPMF is the repositioning of patent portfolio management from a predominantly legal activity to a strategic innovation governance function. While traditional approaches emphasize patent filing, prosecution, and maintenance activities, the proposed framework suggests that intellectual property management should be integrated into the broader innovation ecosystem. Existing literature acknowledges this strategic importance, yet practical implementation often remains fragmented, particularly when knowledge creation, portfolio governance, and commercialization responsibilities are dispersed across separate functions (Gassmann et al., 2010; Tidd & Bessant, 2020). Innovation teams, research groups, intellectual property specialists, commercialization units, and senior management frequently operate within separate structures, creating discontinuities throughout the innovation lifecycle.

The IVPMF addresses this challenge by establishing clear connections between invention generation, technical validation, strategic prioritization, protection decisions, and value realization. This integration enables organizations to make more informed decisions regarding resource allocation, portfolio composition, and innovation investment. The framework therefore supports a shift from "patent-centric management" toward "innovation-centric portfolio governance."

5.2 Strategic Portfolio Decision-Making

Research organizations often generate more invention disclosures than can realistically be pursued through comprehensive patent protection strategies. The proposed framework introduces strategic portfolio prioritization as a dedicated stage within the innovation lifecycle. This stage extends beyond traditional patentability assessments by incorporating broader organizational considerations such as strategic alignment, technology maturity, commercialization potential, competitive positioning, resource requirements, and long-term organizational impact. Rather than asking whether an invention can be patented, organizations should also ask whether the invention should be patented and whether protection contributes to broader strategic goals, a distinction that is consistent with portfolio decision principles discussed by Cooper et al. (2001) and later innovation management work (Trott, 2021).

5.3 The Role of Prior-Art Intelligence Beyond Novelty Assessment

Patent databases represent one of the world's largest sources of technical information and innovation knowledge. The proposed framework advocates for a broader interpretation of prior-art intelligence, encompassing technology trend identification, competitor monitoring, white-space analysis, research direction validation, collaboration opportunity identification, and strategic technology forecasting. Organizations that utilize patent intelligence solely for novelty assessment may overlook significant opportunities for strategic decision-making, particularly because citation and patent information can reveal technological trajectories, knowledge diffusion, and strategic positioning (Hall et al., 2005; WIPO, 2024).

5.4 Commercialization Readiness as a Missing Element in Traditional Patent Management

Many organizations evaluate inventions primarily from technical and legal perspectives while postponing commercialization considerations until later stages. This separation often creates challenges when inventions demonstrate strong patentability potential but limited pathways toward implementation. The proposed framework argues that commercialization readiness should be evaluated much earlier in the innovation lifecycle. Within utility organizations, value may emerge through internal technology deployment, operational efficiency improvements, sustainability enhancement, reliability improvements, cost optimization, service quality enhancement, and strategic partnerships, which is consistent with the broader outcome-oriented view of technology transfer advanced by Bozeman (2000) and Bozeman et al. (2015).

5.5 Knowledge Management Implications

The proposed framework also contributes to knowledge management literature by emphasizing the role of intellectual property as a mechanism for knowledge capture, preservation, and utilization. Patents serve as repositories of technical knowledge and organizational learning. By integrating intellectual property management and knowledge management practices, organizations can create stronger innovation ecosystems

capable of generating sustainable value over time, consistent with the knowledge-creation perspective of Nonaka and Takeuchi (1995) and the more recent synthesis offered by Garcia-Perez et al. (2020).

5.6 Implications for Utility Organizations

Utility organizations operate within environments characterized by long technology development cycles, infrastructure-intensive operations, regulatory requirements, sustainability objectives, and rapid technological transformation. These characteristics create unique challenges for innovation management and intellectual property governance. The proposed framework offers several practical implications: (i) organizations should establish structured invention disclosure systems capable of capturing innovation outputs across diverse technology domains; (ii) intellectual property activities should be integrated into innovation governance structures rather than operating independently; (iii) portfolio decisions should consider strategic and commercial factors in addition to legal patentability criteria; (iv) commercialization readiness assessments should occur early in the innovation lifecycle; and (v) organizations should adopt value-oriented performance indicators that extend beyond patent filing and grant statistics.

5.7 Performance Measurement and KPIs

Traditional intellectual property metrics often focus on patent counts, filing volumes, and grant rates. While important, such indicators provide limited visibility into the strategic contribution of intellectual property. Organizations should therefore adopt balanced performance indicators including invention disclosure quality, portfolio strength, commercialization readiness, deployment outcomes, technology transfer activities, innovation adoption rates, strategic partnerships, and organizational impact. A balanced scorecard approach (Kaplan & Norton, 1996) enables management to evaluate intellectual property performance from financial, innovation, stakeholder, operational, and learning perspectives.

5.8 Contribution to Theory and Practice

From a theoretical perspective, the framework integrates concepts from innovation management, intellectual property management, technology transfer, knowledge management, and innovation governance into a holistic perspective that addresses limitations of fragmented approaches found within existing literature. From a practical perspective, the framework provides innovation managers, intellectual property professionals, technology transfer practitioners, and organizational leaders with a structured approach for managing innovation assets. Unlike purely conceptual models, the framework is grounded in practical observations derived from real-world portfolio management activities and therefore offers direct applicability within innovation-intensive environments.

6. Conclusion and Future Work

This paper proposed the Innovation-to-Value Patent Management Framework (IVPMF), a practitioner-oriented framework designed to support organizations in transforming invention disclosures into strategic organizational assets. The study responds to growing recognition that intellectual property management should extend beyond legal protection activities and become an integrated component of innovation governance systems. Existing literature has frequently examined patent strategy, innovation management, technology transfer, and knowledge management as separate domains. The proposed framework addresses this fragmentation by providing a structured model that connects invention generation, patentability assessment, strategic prioritization, protection strategy, commercialization readiness, and value creation.

The framework consists of nine interconnected stages: Opportunity Identification, Invention Disclosure, Technical Validation, Prior-Art Intelligence, Patentability Assessment, Strategic Portfolio Prioritization, Protection Strategy, Commercialization Readiness, and Strategic Value Creation. Collectively, these stages represent a comprehensive pathway through which organizations can maximize the impact of innovation investments and strengthen the contribution of intellectual property portfolios to organizational objectives.

The findings suggest that organizations achieve greater innovation value when patent portfolio management is integrated into broader innovation governance structures rather than treated as an isolated legal function. Strategic prioritization, commercialization readiness, and knowledge management considerations emerge as critical factors influencing portfolio effectiveness.

Future research may validate the IVPMF through empirical research across multiple sectors including utilities, manufacturing, healthcare, transportation, and digital industries. Researchers may also investigate quantitative relationships between portfolio maturity and innovation outcomes, the role of artificial intelligence in patent intelligence, and the effectiveness of commercialization readiness assessments. Additional research could explore maturity assessment models, benchmarking methodologies, and innovation governance mechanisms that support strategic value creation from intellectual property assets. Ultimately, the proposed framework supports a broader view of intellectual property management, one in which patents are not merely instruments of protection, but strategic assets that contribute to innovation, competitiveness, knowledge creation, and long-term organizational value.

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Ethics Statement

This paper is based on professional observations, publicly available knowledge, and established academic literature related to innovation management, intellectual property portfolio management, technology transfer, and knowledge management. No confidential organizational information, proprietary technologies, commercially sensitive information, patent prosecution details, or unpublished technical data have been disclosed. All examples and observations have been generalized to preserve confidentiality and comply with professional and ethical obligations.

AI Declaration

Generative Artificial Intelligence tools were used solely to support language refinement, structural organization, editing assistance, and drafting activities during the preparation of this manuscript. All professional insights, interpretations, framework development, practitioner observations, analysis, conclusions, and final content were independently reviewed, validated, modified where necessary, and approved by the author. The author accepts full responsibility for the accuracy, originality, integrity, and content of this manuscript.

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