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Managerial challenges in intellectual property in the era of AI implementation

Wyzwania menedżerskie w zarządzaniu własnością intelektualną w erze wdrażania sztucznej inteligencji

ABSTRACT

The rapid development of artificial intelligence (AI) is reshaping how organizations create, protect, and commercialize knowledge, generating new managerial challenges in intellectual property (IP) management. This article identifies key organizational, legal, and strategic barriers related to IP in companies adopting AI systems. Based on a conceptual review of strategic management literature (RBV, dynamic capabilities), IP law, and AI technologies, supported by selected organizational cases, the analysis shows that AI produces novel outputs—algorithms, predictive models, generative content, autonomous solutions that often fall outside traditional IP frameworks. This creates legal uncertainty, higher infringement risks, and the need to redesign governance models. The article proposes an integrated IP management approach for AI-driven environments, combining IP strategy, operational processes, and managerial competencies. Effective alignment of IP governance with innovation and regulatory processes is highlighted as a key factor for achieving sustainable competitive advantage in a data and algorithm-based economy.

STRESZCZENIE

Dynamiczny rozwój sztucznej inteligencji (AI) przekształca sposoby tworzenia, ochrony i komercjalizacji wiedzy w organizacjach, generując nowe wyzwania menedżerskie w obszarze zarządzania własnością intelektualną (IP). Niniejszy artykuł identyfikuje kluczowe bariery organizacyjne, prawne i strategiczne związane z IP w przedsiębiorstwach wdrażających systemy AI. Analiza, oparta na koncepcyjnym przeglądzie literatury z zakresu zarządzania strategicznego (RBV, zdolności dynamiczne), prawa własności intelektualnej oraz technologii AI, a także wsparta wybranymi przykładami organizacyjnymi, pokazuje, że AI generuje nowe rodzaje rezultatów – algorytmy, modele predyktywne, treści generatywne oraz autonomiczne rozwiązań – które często nie mieszczą się w tradycyjnych ramach ochrony IP. Prowadzi to do niepewności prawnej, zwiększonego ryzyka naruszeń oraz konieczności przeprojektowania modeli ładu organizacyjnego. Artykuł proponuje zintegrowane podejście do zarządzania własnością intelektualną w środowiskach opartych na AI, łączące strategię IP, procesy operacyjne oraz kompetencje menedżerskie. Podkreślono, że skuteczne powiązanie ładu IP z procesami innowacyjnymi i regulacyjnymi stanowi kluczowy czynnik osiągania trwałej przewagi konkurencyjnej w gospodarce opartej na danych i algorytmach.

Keywords: artificial intelligence, intellectual property, strategic management, innovation, dynamic capabilities, IP governance, AI regulation.

Słowa kluczowe: sztuczna inteligencja, własność intelektualna, zarządzanie strategiczne, innowacje, zdolności dynamiczne, ład własności intelektualnej, regulacje AI

1. INTRODUCTION

Artificial intelligence (AI) has become one of the key forces transforming contemporary organizations, influencing both their business models and operational processes. Solutions

based on machine learning, natural language processing, and predictive algorithms support strategic decision making, automate complex tasks, and enable the creation of innovative prod-

ucts and services (Brynjolfsson & McAfee, 2017; Davenport & Ronanki, 2018). The literature increasingly emphasizes that AI is no longer merely a technological tool but is evolving into a strategic resource capable of shaping competitive advantage in turbulent environments (Shrestha et al., 2019; Raisch & Krakowski, 2021). At the same time, the importance of intellectual property (IP) is growing, as it forms the foundation for protecting innovation and constitutes a key component of an organization's intellectual capital. Patents, copyrights, trade secrets, and know how safeguard the outcomes of research and development activities from imitation and unauthorized use (Teece, 2000; Chesbrough, 2003). In the context of AI implementation, IP management gains particular relevance because these technologies generate new types of solutions and content that often fall outside traditional legal frameworks related to authorship, inventiveness, or liability (Abbott, 2020; Gervais, 2022). Despite the rising significance of AI, many organizations face a gap between the pace of technological development and their ability to effectively manage intellectual property. Managers must simultaneously protect AI generated outputs, leverage them within innovation strategies, and ensure compliance with rapidly evolving legal regulations. This combination of requirements creates new organizational, legal, and strategic challenges that have not yet been sufficiently conceptualized in the management literature.

The subject of this article is to identify and analyze the strategic managerial challenges related to intellectual property in organizations implementing AI systems. The analysis focuses on two dimensions: first, the impact of AI development and deployment on the logic of IP management; and second, the legal, organizational, and strategic barriers that limit the effective use of IP in AI driven innovation processes. The article adopts a conceptual approach based on a review of literature in strategic management (RBV, dynamic capabilities), intellectual property law, and AI technologies. Selected case studies are also examined to illustrate practical challenges and solutions used by organizations implementing AI systems.

2. THEORETICAL FRAMEWORK – AN INTEGRATED PERSPECTIVE

Contemporary research in strategic management, intellectual property (IP), and artificial intelligence (AI) highlights the growing need to integrate these domains within a unified theoretical approach. Both international and Polish literature emphasize that IP and AI are becoming essential components of organizational architecture, shaping firms' ability to create, protect, and leverage knowledge in innovation processes. The starting point for this analysis is the Resource-Based View (RBV), which posits that competitive advantage arises from resources that are valuable, rare, difficult to imitate, and non-substitutable (Wernerfelt, 1984; Barney, 1991). Intellectual Property – including patents, copyrights, trade secrets, know how, and databases – meets these criteria and forms a foundation for building knowledge based competitive advantage. Polish studies (e.g., B. Baczkó, J. Guliński, M. du Vall) confirm that IP is one of the most important

intangible assets in domestic technology firms, although its effective use is often limited by insufficient managerial competencies and the lack of a systematic approach to knowledge protection. An extension of RBV is the concept of dynamic capabilities (Teece et al., 1997; Eisenhardt & Martin, 2000), which emphasizes organizational processes that enable adaptation to technological and market changes. In this perspective, the value of IP stems not only from its possession but from the organization's ability to continuously create, integrate, protect, and commercialize it. International research (Pisano & Teece, 2007; Granstrand & Holgersson, 2020) shows that effective IP management requires advanced capabilities in monitoring the technological environment, managing patent portfolios, fostering interorganizational collaboration, and building innovation ecosystems. Similar conclusions are drawn in Polish literature (e.g., J. Białyń, A. Pomykalski, A. Zakrzewska Bielawska), which stresses that IP constitutes a strategic "backbone" of organizations, particularly in high technology sectors.

Incorporating artificial intelligence into strategic analysis requires expanding classical theories to include the perspective of autonomous technologies. AI is increasingly viewed as a strategic resource that not only supports decision making but also generates new content, solutions, and innovations (Agrawal et al., 2018; Cockburn et al., 2018). The literature emphasizes that AI reshapes competitive logic by shifting the focus from traditional resources to data, algorithms, and the organization's ability to integrate them (Iansiti & Lakhani, 2020; Makridakis, 2017). Polish studies (e.g., Sienkiewicz 2020; Doligalski & Kaszyński, 2024) highlight AI's growing role in digital transformation processes, noting that its implementation requires the development of new organizational competencies, particularly in managing technological, ethical, and legal risks.

The integration of intellectual property and artificial intelligence in organizational decision making is an emerging area of inquiry. Scholars point out that AI systems generate new types of outputs – such as source code, technical designs, predictive models, and digital content that do not always fit within traditional IP categories (Abbott, 2020; Gervais, 2022). This raises fundamental questions regarding authorship, inventiveness, liability, and the scope of legal protection. Polish literature (du Vall, Traple, Markiewicz) stresses that existing regulations lag behind technological progress, requiring organizations to develop internal IP policies, compliance procedures, and governance mechanisms involving legal, technological, and strategic functions.

A common theme across both international and Polish literature is the increasing importance of organizational capabilities to integrate IP management with innovation and technological processes. AI forces a redefinition of traditional knowledge protection models because it generates outputs with ambiguous legal status while simultaneously increasing IP related risks through automated data analysis, exploration of copyrighted content, and the ability to replicate creative styles. As a result, organizations must develop new competencies in IP risk assessment, training data governance, AI model quality

control, and protection of outputs generated by autonomous systems. The literature indicates that such integrative capabilities are becoming a key source of competitive advantage in a data driven economy.

3. MANAGERIAL BARRIERS TO INTELLECTUAL PROPERTY IN THE IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE SYSTEMS

The implementation of artificial intelligence (AI) systems in organizations is associated with a range of managerial barriers that hinder the effective use and protection of intellectual property (IP). These barriers are organizational, legal, and economic operational in nature, stemming both from the complexity of AI technologies and from the misalignment of existing structures, regulations, and management practices with the specific characteristics of autonomous generative systems. The literature indicates that insufficient competencies, regulatory ambiguity, and high IP protection costs can significantly limit an organization's ability to build knowledge based competitive advantage (Teece, 2018; Gervais, 2019; Granstrand & Holgersson, 2020).

3.1. Organizational Barriers

One of the fundamental organizational barriers is the insufficient level of managerial competencies in both AI technologies and intellectual property management. Research shows that managers often lack the knowledge required to assess IP risks, identify protection opportunities for AI generated outputs, or make decisions regarding licensing and commercialization (Raisch & Krakowski, 2021; Shrestha et al., 2019). Polish literature highlights that domestic enterprises frequently lack specialized competencies that combine legal, technological, and strategic expertise, which hinders effective IP management in AI projects (Baczko, 2020; du Vall, 2021).

Another significant issue is the weak integration between departments responsible for legal affairs, IT, R&D, and strategy. The absence of systemic collaboration leads to fragmented decision making processes, delays in protective actions, and the risk of losing innovation value. Research on innovation management indicates that effective use of IP requires strong cross functional coordination and governance mechanisms that enable rapid responses to technological changes (Helfat & Peteraf, 2015; Grandori, 2020). In the context of AI, this problem is particularly pronounced, as data and algorithm driven projects evolve rapidly, and their outputs are often insufficiently documented or evaluated from an IP protection perspective.

3.2. Legal and Regulatory Barriers

The literature emphasizes that one of the most serious legal challenges related to AI is the lack of clear regulations concerning authorship and inventorship in the case of autonomously generated outputs. Current copyright and patent systems are based on the assumption that the creator is a human, which results in a "protection gap" for content and solutions created by AI (Gervais, 2019; Abbott, 2020). Consequently, organizations lack

certainty about whether and to what extent they can protect the outputs of generative systems, complicating investment and commercialization decisions. Another issue is the risk of third party rights infringements arising from the use of training data. AI models often learn from large datasets that may contain copyrighted content, personal data, or confidential information. Limited transparency regarding data provenance and restricted auditability of models increase legal uncertainty and the risk of disputes (Kaminski, 2020). Polish literature notes that enterprises frequently lack procedures for verifying the legality of training data, which may lead to legal violations and regulatory sanctions (Traple, 2022).

3.3. Economic and Operational Barriers

Economic challenges primarily concern the high costs of protecting and enforcing intellectual property rights. For small and medium sized enterprises, these costs may constitute a significant barrier to entering AI related projects, especially in sectors with high technological dynamism (Arora et al., 2008; Granstrand, 2020). Additionally, organizations must balance the need for rapid innovation deployment with the requirement to ensure adequate IP protection. Lengthy protection procedures may delay commercialization, while bypassing them increases the risk of losing competitive advantage. An important operational challenge is functioning within innovation ecosystems, where collaboration with partners—data providers, algorithm developers, system integrators—requires precise agreements regarding IP ownership and usage. The literature indicates that the absence of clear rules for rights sharing, licensing, and control over jointly generated outputs can lead to conflicts and reduce collaboration effectiveness (Chesbrough, 2003; Holgersson & Granstrand, 2017). In practice, organizations often lack tools to monitor IP flows within complex collaboration networks, increasing the risk of unauthorized knowledge use

4. STRATEGIC CHALLENGES FOR ORGANIZATIONS IN INTELLECTUAL PROPERTY MANAGEMENT WHEN IMPLEMENTING AI SYSTEMS

The implementation of artificial intelligence (AI) systems generates a range of strategic challenges that require organizations not only to adjust operational processes but also to redefine their approach to intellectual property (IP) management. The literature emphasizes that AI transforms the logic of innovation creation and protection, requiring firms to develop new dynamic capabilities, including risk identification, selection of appropriate protection mechanisms, integration of IP with innovation processes, and adaptation of strategies to evolving regulations (Teece, 2018; Iansiti & Lakhani, 2020; Granstrand & Holgersson, 2020). In practice, organizations that fail to address these challenges risk losing competitive advantage, facing legal exposure, and encountering limitations in technology commercialization.

4.1. Managing IP Risk Across the AI System Lifecycle

Managing IP risk in AI projects requires a holistic approach that

spans the entire system lifecycle from the conceptual phase, through model design and training, to deployment and commercialization. The literature indicates that IP risks in AI include, among others, copyright infringements in training data, the unclear legal status of model generated outputs, and difficulties in documenting the creative process (Kaminski, 2020).

In practice, technology companies implement extensive compliance procedures, data audits, and model documentation systems. For example, Google and Meta use “data provenance” mechanisms that allow tracking the origin of training data and minimizing infringement risks. OpenAI has introduced policies for documenting model training processes to facilitate legal and ethical risk assessment.

In Poland, similar practices are adopted by firms in the fintech and medtech sectors, which must comply with regulatory requirements concerning data and algorithmic accountability. IP risk management thus becomes a critical component of organizational strategy, influencing the ability to scale and commercialize AI solutions.

4.2. Strategic Decisions on Forms of IP Protection

Choosing the appropriate form of IP protection in AI projects is a strategic decision that depends on the type of innovation, expected market value, and the dynamics of the competitive environment. From the perspective of the Resource Based View (RBV) and dynamic capabilities, selecting IP protection mechanisms in AI projects should be understood as a strategic choice concerning the configuration and safeguarding of an organization's intangible assets. The literature indicates that firms implementing AI systems must make complex decisions regarding patenting algorithms, protecting source code as trade secrets, licensing AI models, and securing outputs generated by autonomous systems (Abbott, 2020; Gervais, 2022).

Within the RBV framework, these forms of protection determine the rarity, inimitability, and appropriability of value generated by data and algorithm based resources. Dynamic capabilities, in turn, emphasize that the value of IP arises not merely from its possession but from the organization's ability to continuously create, reconfigure, and integrate it with innovation processes and business models. Market practices show that organizations adopt different IP protection strategies depending on the nature of AI technologies, the pace of competitive change, and their level of organizational maturity. Large technology corporations such as IBM and Microsoft develop extensive patent portfolios, treating them as strategic infrastructure that enables protection against imitation, strengthens negotiation power, and supports flexible responses to changes in innovation ecosystems. This approach reflects the organization's ability to systematically seize market value arising from AI development.

Other entities, particularly specialized research and development units such as DeepMind, focus on protecting key components of their models as trade secrets. This strategy limits knowledge disclosure and preserves technological advantage under conditions of high regulatory and technological uncer-

tainty, while requiring advanced organizational capabilities in knowledge control and risk management.

A different model is adopted by companies developing generative systems, including Stability AI, which use model and dataset licensing as both a monetization mechanism and a tool for controlling how technologies are used within partner ecosystems. This approach aligns with the logic of dynamic capabilities, enabling rapid scaling of solutions while maintaining control over critical resources.

As a result, the choice of IP protection mechanisms in AI projects affects not only the level of legal protection but also the organization's ability to adapt, collaborate, and compete over the long term in a data and algorithm driven economy. From the perspective of RBV and dynamic capabilities, IP management in the AI environment becomes a mechanism that enables both safeguarding the value of existing resources and continuously reconfiguring them in response to technological and regulatory changes.

4.3. Integration of IP Management with Innovation Processes

Effective integration of intellectual property (IP) management with artificial intelligence (AI) systems in innovation processes is a key condition for maximizing the business value of technology. Research shows that organizations that link IP management with research and development (R&D) activities achieve faster innovation commercialization and more effective protection of research outcomes (Laursen & Salter, 2006; Pisano & Teece, 2007; Abbott, 2020). From the perspective of the Resource Based View and dynamic capabilities, such integration enables not only the safeguarding of unique knowledge assets but also their reconfiguration in response to changing technological and market conditions.

Effective IP integration includes involving IP experts in AI project teams, developing policies for documenting and evaluating innovations generated by models, using tools for automated analysis of potential IP infringements (e.g., systems detecting code or content similarity), and building managerial competencies in assessing IP value in AI projects (Gassmann & von Zedtwitz, 1999; Chesbrough, 2003). Practical examples show that organizations such as Siemens and Bosch have implemented governance models in which IP teams participate at every stage of AI projects. This approach enables early identification of IP protection opportunities and potential legal risks, increasing the efficiency of innovation processes and shortening time to market for new solutions (WIPO, 2021). Such integration models reflect the dynamic capabilities of organizations, allowing them to simultaneously leverage AI technologies to generate value and systematically secure and manage innovation outcomes.

4.4. The Impact of AI Regulations on Strategic Decisions

Regulations concerning artificial intelligence—such as the EU AI Act, OECD guidelines, or sector specific regulations (e.g., medical, financial)—have a significant impact on organizations' strategic decisions. Requirements related to transparency, accountability,

data quality, and model auditability influence both the design of AI systems and IP protection strategies (Veale & Borgesius, 2021). Practical examples include:

Medical sector (e.g., Philips Healthcare) – companies must document model training processes and ensure auditability, which affects IP protection strategies and requires greater transparency.

Financial sector – regulations on algorithmic decision making limit the use of “black box” models, influencing the choice of protection mechanisms (e.g., reduced ability to rely on trade secret protection for algorithms).

In Poland, organizations implementing AI in the public sector must meet transparency and accountability requirements, which necessitates close cooperation between legal, technological, and managerial departments. Regulations thus become a strategic factor that can either constrain or stimulate innovation, depending on the organization’s ability to adapt.

5. INTELLECTUAL PROPERTY IN THE ARTIFICIAL INTELLIGENCE ENVIRONMENT

5.1. Managerial Challenges in IP Protection in the Context of AI

The development and implementation of artificial intelligence (AI) systems in organizations generate new managerial challenges related to intellectual property (IP). Implementing AI requires not only understanding the technology but also effectively managing the protection of project outcomes, licensing of models, and data security. Managers must simultaneously protect the outputs of AI systems, leverage them in innovation strategies, and ensure compliance with rapidly evolving legal regulations. These challenges encompass organizational, strategic, and legal dimensions, which are only beginning to be systematically examined in management literature (Abbott, 2020; Gervais, 2022).

Research indicates that organizations implementing AI must make decisions regarding, among others, patenting algorithms, protecting source code as a trade secret, licensing AI models, and safeguarding content generated by systems. Practice shows diverse strategies. IBM and Microsoft actively patent AI solutions, building IP portfolios as protective and negotiation tools. DeepMind, in contrast, protects key components of its models as trade secrets, maintaining technological advantage. Generative AI companies such as Stability AI use model and dataset licensing both as a revenue source and as a mechanism for controlling technology use. The choice of IP protection form significantly affects innovation speed, collaboration opportunities, and the scalability of business models.

5.2. Integration of IP Management with Innovation Processes

Effective integration of IP with AI systems in innovation processes is essential for maximizing the business value of technology. Research shows that organizations that link IP management with R&D processes achieve faster innovation commercialization and more effective protection of research outcomes (Laursen & Salter, 2006; Pisano & Teece, 2007).

In practice, this integration includes involving IP experts in AI project teams, developing policies for documenting and evaluating model generated innovations, using tools for automated analysis of potential IP infringements (e.g., code or content similarity analysis), and developing managerial competencies in assessing IP value in AI projects. Practical examples such as Siemens and Bosch demonstrate that involving IP teams at every stage of AI projects enables early identification of protection opportunities and legal risks, increasing innovation efficiency and shortening time to market.

5.3. Intellectual Property Policy in AI Driven Organizations

Organizations implementing AI systems should develop a formalized IP policy that reflects the specific nature of autonomous and generative technologies. Such a policy should define:

- rules for identifying and classifying project outcomes as protectable subject matter (patents, copyrights, trade secrets, databases),
- procedures for selecting protection forms depending on the type of innovation, expected duration of competitive advantage, and market dynamics,
- guidelines for licensing models and data,
- principles for documenting the creation and training processes of AI models.

Empirical studies show that organizations with clearly defined IP policies achieve higher levels of innovation commercialization and more effectively manage legal risks (Laursen & Salter, 2006; Pisano & Teece, 2007). In the context of AI, IP policy should be an integral part of corporate strategy, supporting strategic decision making rather than functioning merely as a legal formality.

5.4. Developing Managerial Competencies in IP and AI

Effective IP management in the AI environment requires developing managerial competencies that combine technological, legal, and strategic knowledge. Managers should understand how AI systems operate, including their limitations and risks, the principles of IP protection, and the strategic implications of choosing specific protection mechanisms for business models and competitive positioning.

In practice, competency development includes training programs, workshops, cross departmental initiatives, and collaboration with external experts such as patent attorneys or AI specialists. Literature highlights the importance of absorptive capacity, the organization’s ability to acquire and utilize new knowledge, as a determinant of innovation performance (Cohen & Levinthal, 1990; Zahra & George, 2002). In the AI and IP context, managerial competencies form a crucial component of this capability, enabling the identification, protection, and exploitation of valuable innovation outcomes.

5.5. IP Management in AI Innovation Ecosystems

AI systems are developed within complex ecosystems involving data providers, algorithm developers, technology integrators,

business partners, and public institutions. IP management in such ecosystems requires:

- precise agreements regulating ownership, co ownership, and licensing of results,
- mechanisms for monitoring IP flows between partners,
- clear rules for the use of data, models, and infrastructure,
- procedures for dispute resolution and liability for IP infringements.

Practice shows that organizations effectively managing IP in ecosystems –e.g., in automotive, medtech, or fintech sectors –achieve higher collaboration efficiency, faster innovation commercialization, and better adaptability to technological change (Chesbrough, 2003; Holgersson & Granstrand, 2017). In AI, managing data as a strategic resource and establishing rules for sharing benefits from models and algorithms becomes particularly important.

5.6. A Governance Model for IP in the AI Environment

Based on literature and organizational practice, a governance model for IP management in the AI environment can be proposed, built on three interconnected pillars: IP strategy and policy, operational processes, and organizational competencies and culture.

1. IP Strategy and Policy – this pillar includes defining the role of IP in organizational strategy, setting protection priorities in key technological areas, establishing principles for partner collaboration, and developing an approach to innovation related risks. IP strategy should be fully integrated with digitalization and innovation strategies, with IP protection decisions made at the executive level to ensure strategic alignment.

2. Operational Processes and AI Project Monitoring – this pillar focuses on implementing procedures that enable systematic IP management throughout the project lifecycle. Key activities include:

- identifying and assessing IP potential in projects,
- auditing training data for legal compliance and infringement risks,
- creating systematic model documentation (data sheets, model cards),
- monitoring IP infringements (e.g., code or content similarity analysis).

The goal is to ensure that IP management becomes an integral part of innovation processes rather than a reactive response to legal or technological threats.

3. COMPETENCIES AND ORGANIZATIONAL CULTURE SUPPORTING IP MANAGEMENT

This pillar involves developing employee and managerial competencies in technology, law, and strategy; promoting cross departmental collaboration; creating incentives for innovation disclosure and IP protection; and fostering awareness of risks associated with AI implementation. Organizational culture should treat IP not merely as a legal requirement but as a strategic asset essential for competitive advantage and adaptability in a dynamic technological environment.

Literature on dynamic capabilities and governance indicates that organizations capable of integrating all three pillars into a coherent IP management system achieve greater strategic flexibility, stronger innovation commercialization capacity, and more effective legal and technological risk management (Teece, 2018; Grandori, 2020). This model enables not only the protection of valuable knowledge and technological assets but also their effective use in creating new business models and developing competitive advantage in high velocity innovation environments.

6. DIRECTIONS FOR RESEARCH AND FUTURE CHALLENGES

Theoretical analysis and observations from organizational practice indicate that intellectual property (IP) management in the context of implementing artificial intelligence (AI) systems remains an area requiring extensive empirical research and further theoretical refinement. Existing conceptual work and case studies provide an important foundation, yet the scale and complexity of AI related challenges make it necessary to develop more systematic research programs encompassing both international and national perspectives.

First, a key research direction involves empirical analyses of IP management practices in organizations implementing AI systems. This includes both quantitative studies (e.g., surveys among technology firms, analyses of patent portfolios, licensing models) and qualitative studies (case studies, in depth interviews with managers, lawyers, and AI engineers). Such research would help clarify how organizations actually identify, protect, and commercialize AI project outcomes, what barriers they encounter, and which solutions they consider most effective.

Second, an important research area concerns assessing the impact of different IP protection models on the effectiveness of AI projects. This includes comparing strategies based on patenting, trade secret protection, open licenses (e.g., open source, open models), and hybrid forms of technology sharing. Studies could examine the market and technological conditions under which particular protection models support faster commercialization, higher innovativeness, or better protection against imitation. Especially valuable would be cross sector comparisons (e.g., medtech, fintech, Industry 4.0) and cross country analyses involving different legal systems and levels of economic development.

Third, the development of IP management in the AI era requires an interdisciplinary approach combining perspectives from management, law, technology, and ethics. Developing comprehensive IP governance frameworks for AI requires collaboration among researchers from various fields from copyright and patent law experts, through scholars of strategic management and innovation, to AI engineers and data specialists. Such an approach could lead to the creation of new governance models that reflect both regulatory requirements (e.g., the AI Act) and the needs of business practice.

Finally, an important research challenge concerns analyzing the long term consequences of AI development for intellec-

tual property systems themselves—including questions about whether fundamental legal categories (author, inventor, work, invention) will require revision, and how the role of IP will evolve in a data and algorithm driven economy.

CONCLUSION

Based on the analysis of the literature and case studies discussed in the publications, it can be concluded that in the era of artificial intelligence, intellectual property is no longer merely a protective mechanism but becomes a strategic organizational asset. Effective IP management requires integrating strategy, operational processes, and organizational competencies and culture that support innovation. Such a holistic approach enables the protection of technological assets, their effective use in business processes, and the minimization of legal and regulatory risks.

From a managerial perspective, this means treating IP as a strategic resource developed and monitored at the executive level, while simultaneously building staff competencies and fostering collaboration among legal, technological, and business departments. Taking into account evolving AI regulations allows organizations not only to maintain compliance but also to leverage regulatory challenges as a source of competitive advantage. Consequently, intellectual property in the context of AI becomes a foundation for strategic adaptability, sustainable technology use, and long term competitive advantage. This article provides a synthetic overview of the current state of knowledge and identifies directions for future research.

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