

Intellectual Property Rights in the Era of Open Innovation: A Systematic Review of Knowledge Sharing, Collaboration, and Competitive Advantage

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Abstract

The increasing importance of knowledge-intensive competition has transformed intellectual property rights from predominantly legal instruments into strategic organizational resources. At the same time, the emergence of open innovation has challenged the traditional assumption that firms create, control, and commercialize knowledge primarily within organizational boundaries. Organizations increasingly collaborate with universities, suppliers, customers, start-ups, competitors, research institutions, and technology platforms to access external knowledge and accelerate innovation. This development creates a fundamental strategic tension: firms must simultaneously protect valuable knowledge and facilitate knowledge exchange. The present study systematically reviews the literature examining the relationship between intellectual property rights and open innovation. The review synthesizes research concerning patents, copyrights, trademarks, trade secrets, licensing, collaborative innovation, knowledge sharing, technology transfer, and competitive advantage. The findings indicate that intellectual property rights perform a dual function in open innovation environments. They can restrict unauthorized appropriation and protect investments in knowledge creation while also facilitating knowledge exchange by defining ownership, licensing conditions, and commercialization rights. The review further demonstrates that the effectiveness of intellectual property strategies depends upon organizational capabilities, industry characteristics, technological complexity, institutional quality, and the structure of innovation networks. The literature suggests that excessive protection may inhibit knowledge diffusion, whereas insufficient protection may discourage investment and collaboration. Consequently, optimal intellectual property management involves balancing protection and openness rather than maximizing either objective independently. The review identifies significant research gaps concerning intellectual property governance in platform ecosystems, artificial intelligence, collaborative patents, small and medium-sized enterprises, university-industry partnerships, and emerging forms of digital knowledge. The article develops an integrated conceptual framework linking intellectual property strategy, openness, knowledge exchange, innovation capability, and competitive advantage and proposes directions for future empirical research.

Keywords: intellectual property rights; open innovation; patents; knowledge sharing; licensing; technology transfer; innovation networks; competitive advantage; intellectual property strategy

1. Introduction

Knowledge has become one of the most important resources underlying contemporary economic activity. Technological change, globalization, digitalization, and increasing competition have encouraged organizations to invest heavily in research, development, design, creativity, and intangible assets. As a result, intellectual property has assumed a central position within corporate strategy and innovation policy.

Intellectual property rights provide legal mechanisms for controlling particular forms of intangible assets. Patents can protect inventions, copyright can protect original creative expression, trademarks can protect distinctive signs, and trade secrets can protect commercially valuable confidential information. These mechanisms enable organizations to establish legally recognized interests in knowledge and creativity.

Historically, innovation management was often conceptualized around a relatively closed model of research and development. Organizations were expected to develop technologies internally, protect them through intellectual property rights, and commercialize them through internal production and distribution systems.

This model has been substantially challenged by the development of open innovation. Chesbrough's concept of open innovation emphasizes that organizations can and should use external as well as internal ideas and pathways to market. Innovation is consequently no longer viewed exclusively as an internally generated process. Instead, it may emerge from networks involving universities, suppliers, customers, competitors, independent inventors, start-ups, research organizations, and other external actors.

Open innovation, however, creates a paradox concerning intellectual property.

Organizations must disclose or exchange sufficient knowledge to facilitate collaboration while simultaneously protecting knowledge that provides strategic value. If an organization protects everything, collaboration may become difficult. If it shares everything without adequate safeguards, competitors or partners may appropriate valuable knowledge.

The central strategic question is therefore not whether intellectual property protection and openness are compatible. Rather, it is how intellectual property can be strategically designed to facilitate valuable knowledge exchange while preserving the organization's ability to capture returns from innovation.

This question has become increasingly important because innovation increasingly occurs across organizational boundaries.

University-industry collaboration provides one example. Universities generate scientific knowledge, while companies often possess manufacturing, marketing, financing, and commercialization capabilities. Intellectual property rights can provide a framework through which scientific discoveries are transformed into commercial technologies.

Similarly, start-up ecosystems depend heavily upon licensing, patents, technology transfer, and contractual arrangements. A start-up may build its business around licensed university technology or may develop innovations that are subsequently licensed to established companies.

The importance of IP is also evident in technology ecosystems. Companies may own patents covering foundational technologies while allowing external developers to create complementary products. In such environments, intellectual property establishes boundaries within which ecosystem participants can innovate.

The increasing use of artificial intelligence, cloud computing, biotechnology, advanced manufacturing, and digital platforms further complicates the relationship between intellectual property and open innovation.

The purpose of this article is therefore to systematically examine the existing literature on intellectual property rights and open innovation and to identify the mechanisms through which IP affects knowledge sharing, collaboration, innovation capability, and competitive advantage.

The review addresses the following research questions:

RQ1: How does existing literature conceptualize the relationship between intellectual property rights and open innovation?

RQ2: How do organizations use intellectual property rights to facilitate knowledge sharing and collaboration?

RQ3: What factors determine whether intellectual property protection supports or constrains open innovation?

RQ4: What research gaps remain concerning IP governance in contemporary innovation ecosystems?

The remainder of the article is organized into eight sections. Section 2 develops the conceptual foundations. Section 3 describes the systematic review methodology. Section 4 synthesizes the literature according to major themes. Section 5 presents an integrated conceptual framework. Section 6 discusses theoretical and managerial implications. Section 7 identifies future research opportunities. Section 8 concludes the study.

2. Conceptual Foundations

2.1 Intellectual Property Rights

Intellectual property rights represent legally enforceable interests in intangible creations and commercially valuable information.

Although individual IP rights differ substantially, they share a common economic characteristic: they establish a degree of control over intangible resources.

Patents provide protection for qualifying inventions. Copyright protects original forms of expression. Trademarks protect distinctive signs that identify goods or services. Trade secrets protect confidential information possessing commercial value. These rights differ in their requirements, duration, scope, and economic function.

The diversity of IP rights means that organizations can develop layered protection strategies. A single innovation may involve several forms of intellectual property simultaneously.

For example, a medical technology may be protected by patents covering technical inventions, trademarks covering the product brand, copyright covering software or documentation, and trade secrets covering manufacturing processes.

Consequently, IP strategy is rarely equivalent to patent strategy.

2.2 Open Innovation

Open innovation describes an approach in which organizations use knowledge flows across organizational boundaries to accelerate innovation.

The conventional closed model assumes that important knowledge is generated and developed within the organization. Open innovation instead recognizes that valuable knowledge can exist outside organizational boundaries.

External knowledge can enter an organization through:

- licensing;
- strategic alliances;
- acquisitions;
- university partnerships;
- supplier relationships;
- customer involvement;
- crowdsourcing;
- corporate venture investments; and
- research collaborations.

Knowledge may also move outward through licensing, spin-offs, joint ventures, partnerships, and commercialization agreements.

The resulting innovation system is therefore characterized by multiple knowledge flows.

2.3 The Protection-Openness Paradox

The literature repeatedly identifies a fundamental paradox.

Innovation requires knowledge exchange, but knowledge exchange creates risks of appropriation.

This can be represented as:

Greater openness → greater knowledge access → greater innovation opportunities
but also:

Greater openness → greater exposure → greater appropriation risk

Intellectual property can potentially moderate this tension.

For example, a patent can enable a firm to disclose technical information while retaining exclusive rights over commercialization. Licensing can allow another organization to use protected technology under specified conditions.

Thus, IP can transform knowledge from an uncontrolled resource into a tradable strategic asset.

3. Systematic Literature Review Methodology

3.1 Research Design

The study employs a systematic literature review methodology.

The objective of the review is not merely to summarize existing research but to identify recurring conceptual patterns, theoretical perspectives, research methodologies, and unresolved questions.

The review process consisted of five stages:

1. identification of relevant literature;
2. screening of publications;
3. application of inclusion criteria;
4. thematic classification; and
5. synthesis of findings.

The review was conceptually informed by established systematic review principles and contemporary literature reviews examining innovation and intellectual property.

3.2 Search Strategy

The literature search was structured around combinations of keywords related to intellectual property and open innovation.

The principal search terms included:

"intellectual property" AND "open innovation"

"patent" AND "open innovation"

"IP strategy" AND "knowledge sharing"

"intellectual property" AND "technology transfer"

"patent" AND "collaboration" AND "innovation"

"trade secret" AND "innovation"

"licensing" AND "open innovation"

"intellectual property" AND "competitive advantage"

Additional combinations were used to identify literature concerning universities, SMEs, digital technologies, and innovation ecosystems.

3.3 Inclusion Criteria

Studies were considered relevant where they:

1. addressed intellectual property or a specific IP mechanism;
2. examined innovation, knowledge exchange, collaboration, or commercialization;
3. contributed conceptually or empirically to understanding IP strategy;
4. were published as scholarly literature; and
5. provided sufficient information for thematic interpretation.

Studies were excluded where IP was mentioned only incidentally or where the primary subject was unrelated to innovation or knowledge management.

3.4 Thematic Analysis

The reviewed literature was classified into six major themes:

Theme	Principal Focus
IP as protection	Prevention of imitation and appropriation
IP as exchange infrastructure	Licensing and knowledge transfer
IP and collaboration	Partnerships and innovation networks
IP and competitive advantage	Strategic value of intellectual assets
IP and digital innovation	Software, platforms, AI, and digital content
IP governance	Institutional and organizational management

Thematic analysis was selected because the literature spans multiple disciplines and employs different methodological approaches.

4. Findings

4.1 IP Protection and Innovation Incentives

The first major theme concerns the conventional economic rationale for intellectual property.

Innovation often requires significant investment before commercial returns become available. Intellectual property protection can potentially increase expected returns by reducing unauthorized imitation.

Patents are particularly relevant where research and development costs are high and imitation is relatively easy.

The literature nevertheless demonstrates that patent protection is neither universally necessary nor universally sufficient.

In some industries, secrecy may be more effective because patent disclosure provides competitors with information concerning the underlying technology.

In other industries, rapid innovation cycles may make formal registration less important than speed to market.

The effectiveness of IP protection therefore depends upon technological and industry conditions.

This finding supports the concept of an **appropriability regime**, in which the ability of firms to capture returns from innovation varies according to legal, technological, and market conditions.

4.2 Intellectual Property as a Knowledge-Exchange Mechanism

The second major theme represents an important departure from the traditional protection-oriented perspective.

Rather than merely preventing knowledge use, IP rights can facilitate knowledge exchange.

Licensing provides the clearest example.

A patent owner may grant another organization permission to use patented technology in exchange for royalties or other contractual benefits.

This creates a controlled knowledge flow.

Without clearly defined ownership rights, the parties may face uncertainty concerning who owns the innovation, who may commercialize it, and how revenues should be distributed.

IP therefore provides an institutional foundation for transactions involving knowledge.

The value of intellectual property in this context derives not only from exclusion but from **transferability**.

4.3 Licensing and Open Innovation

Licensing is one of the most extensively discussed mechanisms connecting IP and open innovation.

There are two broad directions of licensing.

Inbound licensing

Organizations acquire external technologies to support internal innovation.

Outbound licensing

Organizations allow external parties to commercialize technologies developed internally.

Inbound licensing can reduce research and development time.

Instead of developing every technological component internally, a firm can acquire access to an existing technology.

Outbound licensing can create additional revenue from technologies that the original owner does not possess the capacity or strategic interest to commercialize.

Consequently, licensing can increase the economic value generated from intellectual property.

The literature suggests that licensing becomes particularly valuable where firms possess complementary resources.

A university may possess scientific knowledge but lack production capabilities. A manufacturing firm may possess production capabilities but lack specialized scientific expertise.

Licensing can connect these complementary assets.

4.4 Intellectual Property and University-Industry Collaboration

Universities represent important sources of knowledge within innovation systems.

Academic researchers generate scientific discoveries that may have commercial applications. Businesses can provide resources, commercialization expertise, manufacturing capacity, and access to markets.

Intellectual property rights can help structure these relationships.

Patent ownership may determine how commercialization revenues are distributed.

Licensing agreements may specify how technologies can be used. Research contracts may establish ownership over jointly developed inventions.

The literature indicates that successful university-industry technology transfer requires more than formal IP ownership.

Relationship quality, absorptive capacity, trust, communication, and commercialization capabilities are also important.

Thus, IP should be viewed as one component of a broader institutional and relational infrastructure.

4.5 Intellectual Property and Collaborative Innovation

Collaboration can generate innovation benefits because organizations possess different knowledge, resources, and technological capabilities.

However, collaboration also creates risks.

Partners may disagree over:

- ownership;
- inventorship;
- licensing rights;
- commercialization;
- confidentiality;
- publication;
- revenue sharing; and
- future use.

Clear IP arrangements can reduce these uncertainties.

This is particularly important in collaborative research involving multiple organizations.

The literature suggests that early clarification of IP ownership can facilitate collaboration because participants understand the expected distribution of rights and benefits.

However, overly restrictive agreements can discourage collaboration.

The optimal arrangement therefore requires a balance between protection and flexibility.

4.6 Patents and Competitive Advantage

The literature also considers whether patent ownership creates competitive advantage.

Patents may contribute to competitive advantage through several mechanisms.

First, they can prevent competitors from using protected technologies.

Second, they can strengthen bargaining power.

Third, they can generate licensing revenues.

Fourth, they may attract investors.

Fifth, they can support strategic alliances.

Sixth, they can create barriers to entry.

However, patent quantity does not necessarily equal patent quality.

A company possessing thousands of patents may not necessarily possess greater competitive advantage than a company with a smaller number of strategically important patents.

Consequently, researchers increasingly distinguish between **patent quantity** and **patent value**.

Patent citations, technological relevance, scope, market coverage, licensing activity, and litigation history may provide additional information concerning strategic importance.

4.7 Trade Secrets and Open Innovation

Trade secrets present an interesting contrast to patents.

Whereas patents generally require public disclosure, trade secrets depend upon confidentiality.

Trade secrets may therefore be attractive for technologies that can remain confidential for extended periods.

Examples may include:

- manufacturing processes;
- algorithms;
- recipes;
- customer information;
- business strategies;
- technical know-how; and

- proprietary datasets.

However, secrecy can complicate open innovation because collaboration frequently requires information disclosure.

Organizations therefore need mechanisms for determining which information should remain confidential and which information can be shared.

Confidentiality agreements and restricted-access systems can support controlled knowledge exchange.

4.8 Copyright and Collaborative Digital Innovation

Copyright has become increasingly significant as innovation moves into digital environments.

Software, digital media, online educational content, databases, photographs, audiovisual works, and digital publications may involve copyright protection.

Digital collaboration creates complex questions concerning ownership and reuse.

A collaborative project may involve multiple contributors creating materials that are subsequently distributed through a platform.

The organization must determine:

- who owns the copyright;
- who may reproduce the work;
- who may modify it;
- whether third-party material can be incorporated;
- how licensing revenues are distributed; and
- how derivative works are treated.

These questions have become particularly significant with the growth of generative AI.

4.9 Intellectual Property and Artificial Intelligence

Artificial intelligence presents perhaps the most significant emerging challenge identified in contemporary literature.

AI systems can generate content at unprecedented speed and scale.

This creates questions concerning both inputs and outputs.

The input question concerns whether copyrighted or otherwise protected materials can be used to train AI systems.

The output question concerns whether AI-generated material qualifies for copyright protection and, if so, who owns the resulting rights.

The issue becomes particularly complicated when AI-generated material incorporates or resembles existing protected works.

The literature is currently developing rapidly, and significant uncertainty remains concerning appropriate legal and economic frameworks.

Future research should therefore investigate AI through both legal and innovation-management perspectives.

5. Intellectual Property Governance

5.1 Organizational IP Capabilities

The literature increasingly recognizes that possessing intellectual property is insufficient.

Organizations must also develop **IP capabilities**.

These capabilities include:

- identifying valuable knowledge;
- deciding what to protect;
- selecting appropriate legal mechanisms;
- monitoring competitors;
- negotiating licenses;
- enforcing rights;
- evaluating IP portfolios; and
- integrating IP with innovation strategy.

Organizations with strong IP capabilities may therefore be better positioned to extract economic value from knowledge.

5.2 IP Portfolio Management

Portfolio management involves evaluating intellectual property collectively rather than individually.

A portfolio may include hundreds or thousands of patents, trademarks, copyrights, designs, and trade secrets.

Management decisions include:

Acquisition: What should the organization protect?

Maintenance: Which rights should continue to be renewed?

Licensing: Which assets can generate external revenue?

Enforcement: Which rights require active protection?

Abandonment: Which assets no longer provide sufficient strategic value?

Effective portfolio management can reduce unnecessary costs and increase strategic value.

6. The Moderating Role of Organizational Capabilities

The literature indicates that IP does not operate independently.

Organizational capabilities influence whether IP protection produces valuable outcomes.

A firm may own an important patent but lack the ability to manufacture the associated product.

Similarly, a university may own a valuable technology but lack access to commercialization networks.

This suggests the following relationship:

IP resources + complementary capabilities → innovation value

rather than:

IP resources → innovation value

Complementary assets can include:

- manufacturing;
- distribution;
- marketing;
- technical expertise;
- financial resources;
- customer relationships;
- regulatory expertise; and
- managerial capabilities.

7. Intellectual Property and Small and Medium-Sized Enterprises

Small and medium-sized enterprises face distinctive IP challenges.

Large firms can maintain dedicated legal teams and substantial patent portfolios.

Smaller firms may have limited financial resources and expertise.

The costs associated with:

- patent applications;
- international filings;
- litigation;
- monitoring;
- legal advice; and
- portfolio maintenance

can be significant.

SMEs may consequently rely more heavily on informal mechanisms such as secrecy and lead-time advantages.

At the same time, IP can be particularly important for start-ups seeking investment.

A defensible technology portfolio may signal technological capability to potential investors.

Future empirical studies should investigate how resource constraints shape SME IP strategies.

8. Intellectual Property in Innovation Ecosystems

Innovation increasingly occurs within ecosystems rather than individual organizations.

An ecosystem can involve:

Lead firms → suppliers → developers → universities → start-ups → customers → regulators

Each participant may possess different intellectual assets.

The ecosystem therefore requires rules concerning ownership, access, interoperability, licensing, and commercialization.

Platform businesses provide a particularly important example.

A platform may control technological infrastructure while third-party developers create complementary applications.

The platform's IP strategy must therefore balance control with participation.

Excessive restrictions can reduce ecosystem innovation.

Insufficient protection can undermine the platform's competitive position.

This produces an ecosystem-level version of the protection-openness paradox.

9. Integrated Conceptual Framework

Based on the systematic synthesis, this article proposes an integrated framework connecting intellectual property strategy with open innovation and competitive advantage.

The framework consists of five stages:

Stage 1: Knowledge Creation

Organizations generate technological, scientific, creative, or organizational knowledge.

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Stage 2: IP Identification

Organizations identify which knowledge assets have strategic or commercial value.

↓

Stage 3: IP Strategy

Organizations select appropriate protection mechanisms.

These may include:

Patents + Copyright + Trademarks + Trade Secrets + Contracts

↓

Stage 4: Knowledge Exchange

Protected knowledge can then be:

retained + licensed + shared + commercialized + jointly developed

↓

Stage 5: Innovation Outcomes

The resulting outcomes may include:

- innovation performance;
- commercialization;
- revenue;

- market position;
- collaboration;
- competitive advantage; and
- organizational learning.

The relationship is moderated by:

Institutional quality + technological complexity + organizational capabilities + industry structure + partner relationships

10. Summary of Major Findings

The literature synthesis produces seven principal conclusions.

First, intellectual property is not merely a defensive mechanism. It can also facilitate knowledge exchange.

Second, open innovation does not eliminate the need for IP protection. Instead, it changes the strategic function of IP.

Third, licensing represents a major mechanism connecting protection with openness.

Fourth, organizational capabilities influence whether IP produces economic value.

Fifth, the optimal IP strategy varies substantially across industries.

Sixth, digitalization and artificial intelligence are transforming traditional assumptions concerning ownership, creativity, and knowledge appropriation.

Seventh, future IP strategy will increasingly require ecosystem-level governance.

11. Theoretical Implications

The findings have several theoretical implications.

First, they support a broader understanding of intellectual property as a strategic resource.

The resource-based view suggests that valuable and difficult-to-imitate resources can contribute to competitive advantage. IP can satisfy these characteristics when combined with appropriate organizational capabilities.

Second, the knowledge-based view emphasizes that organizations compete partly through the creation, integration, and application of knowledge. IP establishes institutional boundaries around some forms of organizational knowledge.

Third, transaction cost theory explains why IP can facilitate collaboration. Clearly defined rights can reduce uncertainty concerning ownership and permitted use.

Fourth, open innovation theory demonstrates that knowledge can cross organizational boundaries while remaining subject to strategic control.

Together, these perspectives suggest that IP strategy should be examined as a multidimensional organizational capability.

12. Managerial Implications

Managers should reconsider the assumption that IP strategy is primarily a legal function.

Instead, IP decisions should be integrated into research and development, product development, partnerships, commercialization, and corporate strategy.

Organizations should identify their most strategically valuable knowledge and determine the appropriate level of protection.

They should also establish clear procedures for collaborative projects.

Before entering a partnership, organizations should clarify ownership, licensing, confidentiality, publication, and commercialization arrangements.

Managers should additionally evaluate whether unused IP can be monetized through licensing or strategic partnerships.

Finally, firms operating in digital environments should establish specific governance mechanisms for AI-generated content, data, software, and platform-based innovation.

13. Policy Implications

The review also provides several implications for policymakers.

First, intellectual property systems should maintain an appropriate balance between incentives and knowledge diffusion.

Second, policymakers should improve IP education and advisory support for smaller businesses.

Third, technology-transfer systems should encourage productive university-industry relationships.

Fourth, emerging technologies such as artificial intelligence require regulatory frameworks capable of addressing rapidly changing forms of knowledge creation.

Fifth, international coordination remains essential because innovation networks increasingly cross national borders.

The policy objective should therefore be neither maximum protection nor maximum openness.

Instead, policymakers should seek **effective intellectual property governance that supports innovation while preserving socially valuable knowledge diffusion.**

14. Research Gaps

The systematic review identifies several important research gaps.

14.1 Quantitative Measurement of Openness

Future research should develop better measures of organizational openness.

Researchers could examine whether different levels of IP protection correspond to different degrees of external collaboration.

14.2 AI and Intellectual Property

AI requires extensive further investigation.

Potential research questions include:

- How does AI change organizational IP strategies?
- How should training data be governed?
- What determines the economic value of AI-generated content?
- How do organizations allocate ownership of AI-assisted inventions?
- How should licensing models evolve?

14.3 Digital Platforms: Future studies should examine IP governance within platform ecosystems. Research could investigate whether stronger platform IP control improves or reduces innovation by complementors.

14.4 SMEs: More empirical studies are required concerning the IP strategies of smaller firms. Particular attention should be given to financing constraints, patent costs, informal protection, and investor perceptions.

14.5 Emerging Economies: The literature remains geographically concentrated. Future comparative studies should investigate whether the relationship between IP and open innovation differs according to institutional quality, enforcement capacity, economic development, and technological capability.

14.6 Sustainability: An emerging area concerns intellectual property and sustainable innovation. Green technologies often require extensive collaboration. Research should therefore investigate how IP protection influences the diffusion of environmentally beneficial technologies.

15. Conclusion

The purpose of this systematic literature review was to examine the relationship between intellectual property rights and open innovation.

The synthesis demonstrates that intellectual property occupies a dual position within contemporary innovation systems.

On one side, IP provides organizations with mechanisms for protecting investments in knowledge and preventing unauthorized appropriation. On the other side, IP can facilitate knowledge exchange by creating transferable and enforceable rights.

This dual role is particularly important in open innovation environments.

The literature suggests that organizations should not choose between complete openness and complete secrecy. Instead, successful innovation strategies involve selective openness combined with strategic protection.

Organizations must determine which knowledge should remain proprietary, which knowledge can be shared, and which knowledge can be commercialized through licensing or partnerships.

The appropriate balance depends upon industry structure, technological characteristics, organizational capabilities, institutional conditions, and the nature of the innovation network.

The transformation of the innovation environment through digital technologies and artificial intelligence makes this issue increasingly important.

Traditional categories of inventor, creator, producer, consumer, and intermediary are becoming less distinct. Knowledge can be generated collaboratively, modified algorithmically, distributed digitally, and commercialized through global platforms. These developments require intellectual property scholarship to move beyond conventional debates concerning protection versus access.

Future research should examine IP as a dynamic governance mechanism within innovation ecosystems.

Such a perspective recognizes that intellectual property is not simply a legal boundary around knowledge. It can also be a mechanism through which knowledge is exchanged, combined, licensed, commercialized, and transformed into economic and social value.

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