

Tracing Strategic Evolution in the Online Gaming Industry Using BERTopic

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Abstract

This study investigates the strategic evolution of the online gaming industry by applying BERTopic, a transformer-based topic modeling technique capable of capturing semantic nuances and temporal dynamics. A longitudinal dataset comprising annual reports, press releases, and strategic documents from leading global gaming companies between 2018 and 2023 was analyzed. Through BERTopic, the study identifies core thematic clusters and traces how strategic priorities such as cross-platform integration, esports expansion, metaverse adoption, and regulatory adaptation have shifted over time. Compared to traditional models like LDA, BERTopic provides superior interpretability and allows for the visualization of topic trajectories across time slices. The findings highlight a gradual convergence in industry discourse around digital ecosystems and immersive user engagement, reflecting broader technological and market transformations. This paper contributes to the literature by demonstrating the utility of advanced topic modeling in strategic management studies, while offering actionable insights into the narrative strategies of digital platform firms.

Keyword : BERTopic, Online gaming industry, Strategic evolution, Innovation orchestration

1. Introduction

The online gaming industry has undergone rapid transformation in recent years, driven by technological innovation, shifting regulatory environments, and evolving user expectations. As games extend beyond pure entertainment into education, culture, and broader digital ecosystems, firms must continuously adapt their strategic orientations to maintain competitive advantage [1][2]. Yet, while scholarly attention has explored specific facets of game design, monetization, or platform economics, there remains a lack of comprehensive, longitudinal analyses that capture how industry wide strategic priorities emerge, interact, and evolve over time.

Textual data from industry focused news sources offer a rich, timely window into firms' public signaling and market positioning. Traditional natural language processing (NLP) techniques such as Latent Dirichlet Allocation (LDA) or Non-negative Matrix Factorization (NMF) provide broad topic

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groupings, yet often lack the semantic depth and temporal granularity necessary for tracking evolving discourses in fast-moving sectors. In contrast, BERTopic—a transformer-based topic modeling method—offers a robust alternative by generating context-aware topic clusters and enabling chronological mapping of thematic trajectories. Despite its growing use in technical domains, its application in strategic management studies remains underexplored, particularly within dynamic industries such as gaming.

To fill the gap in strategic management research, this study applies BERTopic to a corpus of 1,054 news articles published between 2022 and 2025, extracting thirteen core strategic themes that span global content partnerships, education and cultural integration, regulatory responses, premium branding, ecosystem orchestration, and more. By mapping these topics' emergence, prominence, and interrelations, we uncover how leading game companies orchestrate multi-layered innovation strategies that transcend product development, encompassing technology, policy, culture, and user communities.

Our findings contribute to both methodology and practice. Methodologically, we demonstrate the utility of embedding-based topic modeling for longitudinal strategic analysis in fast-moving digital industries. Practically, we offer executives and policymakers a structured framework to anticipate shifts in competitive narratives and to align innovation initiatives with emerging thematic priorities.

2. Theoretical Background

2.1 South Korean Online Game Industry

As of 2023, South Korea ranks fourth in the global game market with a 7.8% share, following the United States (22.8%), China (22.4%), and Japan (9.6%). In domestic revenues, mobile games dominate with 13.6 trillion KRW, accounting for 59.3% of total sales, followed by PC games with 5.9 trillion KRW (25.6%). Console and arcade games contribute 1.1 trillion KRW (4.9%) and 285 billion KRW (1.2%) respectively, highlighting the dominance of mobile platforms in Korea's gaming ecosystem.

South Korea offers a globally relevant case for understanding orchestration in platform-based creative industries. The country's high innovation density, policy complexity, and international market involvement provide an ideal setting to examine how firms strategically align technological and institutional components in response to rapid industry transformation.

Originally defined by client-server architecture and multiplayer design [3], Korea's game industry has evolved into a multi-layered innovation ecosystem. It now incorporates artificial intelligence, cloud infrastructure, streaming services, and transmedia storytelling [4]. Major companies like Nexon, Krafton, and Wemade have transitioned from developers to ecosystem orchestrators. These firms manage not only

technology and IP portfolios but also regulatory engagement, cultural positioning, and cross-industry partnerships [5][6].

The Korean game industry is particularly noteworthy for its ability to internalize external pressures-ranging from Chinese content regulations to global consumer expectations-and respond through strategically coordinated innovation and market alignment. This makes it an instructive context for observing orchestration capabilities in practice.

2.2 Strategic Evolution in the Online Gaming Industry

In the context of the online gaming industry's strategic evolution, orchestration has progressed from a narrow technical or structural role to a holistic capability that weaves together technology, institutional dynamics, and organizational processes. As digital platforms mature, game developers and publishers must transcend reactive, short-term coordination and instead craft forward-looking alignment strategies to sustain competitive momentum and drive long-term growth [7][8].

This study adopts a dynamic capabilities theory [9] and institutional theory [10][11], framing orchestration as a proactive capacity for managing uncertainty, reallocating resources, and influencing ecosystem evolution. Rather than reacting passively to change, firms shape strategic trajectories by aligning internal processes with external conditions. Tools such as public communications, investor messaging, and market signaling serve as mechanisms for fostering legitimacy, securing stakeholder buy-in, and defining ecosystem roles in advance.

This transformation is captured through a four-domain orchestration framework that includes technological convergence, global expansion, institutional alignment, and cross-sector integration. Firms in digital platform ecosystems must address these dimensions simultaneously to maintain competitive advantage and ensure strategic coherence across different stakeholder levels [12].

Drawing on insights from the South Korean game industry, this study further elaborates these four core domains of strategic orchestration. Technological convergence involves the integration of artificial intelligence, cloud computing, and multi-platform infrastructures to create scalable and innovation-friendly environments. Global expansion refers to the development of intellectual property (IP) licensing models and localization strategies, which enable firms to successfully enter and adapt to diverse international markets. Institutional alignment emphasizes the importance of engaging with evolving regulatory frameworks and policy landscapes in order to maintain legitimacy and compatibility within the broader ecosystem. Cross-sector integration highlights the extension of collaboration beyond the gaming industry into adjacent sectors such as education, e-sports, and streaming. This broadens the societal relevance and

innovation capacity of platform-based ecosystems.

These domains indicate that orchestration is not only about managing coordination but also about enabling systemic alignment that supports innovation, resilience, and long-term growth. While topic modeling helps visualize thematic shifts, the emphasis in this study is on how firms align complex drivers of change into coherent strategies.

Although dynamic capabilities theory highlights the sensing, seizing, and reconfiguring of resources [9], it often treats these processes as internal. Institutional theory, on the other hand, focuses on how organizations conform to or shape regulatory pressures [10][11]. However, both tend to underplay how strategic alignment is operationalized across ecosystem levels in response to external complexity.

Building on this perspective, five interrelated orchestration practices have been identified that foster innovation within platform ecosystems [13]. Strategic design involves formulating long-term innovation trajectories that align with changing market structures and industry dynamics. Relational management focuses on cultivating trust-based and cooperative relationships among a diverse group of ecosystem participants to foster resilience and alignment. Resource integration refers to the purposeful combination of complementary assets and capabilities across firm boundaries to enhance collective value creation. Technological leveraging involves implementing scalable and interoperable infrastructures, including AI systems and cloud platforms, that enable continuous innovation across the ecosystem. Innovation facilitation is about establishing organizational environments and routines that support experimentation, co-learning, and sustained knowledge sharing.

Together, these practices establish orchestration as a capability for shaping innovation trajectories and managing multi-actor complexity in strategically effective ways. They underscore that orchestration is not only a governance function but also a critical lever for strategic adaptation and institutional alignment in digital ecosystems.

3. Methods

3.1 Sample and Data

To initiate the analysis, data related to the online game industry were collected and preprocessed. We utilized Textom, a social network data collection tool that enables keyword-based searches, suggests related terms, and provides keyword frequency matrices. Specifically, 1054 news articles published between March 1, 2022, and February 28, 2025 were gathered using keywords relevant to the online game industry, resulting in a comprehensive dataset covering various industry aspects over this period.

Following collection, we refined the dataset to ensure relevance and quality. Basic text preprocessing steps were applied, including removal of special characters, punctuation, and numeric values, and converting all text to lowercase for consistency. Additionally, common Korean stopwords-such as postpositions and conjunctions-were filtered out using a predefined list.

For morphological analysis, we employed the KoNLPy Python library with the Okt tokenizer, extracting primarily nouns to focus on content-bearing terms. Further manual filtering was conducted to exclude less meaningful or irrelevant keywords, including adjectives, verbs, adverbs, and general-purpose terms unrelated to the online game industry. This preprocessing ensured the dataset's alignment with the research objectives and enhanced the effectiveness of the subsequent analysis.

3.2 BERTopic Modeling

This study applies BERTopic to enhance the semantic analysis of the dataset. BERTopic leverages pre-trained transformer-based language models (Korean BERT) to generate contextual embeddings of documents, allowing the model to capture semantic relationships beyond simple word co-occurrence. These embeddings are then clustered using density-based algorithms (HDBSCAN), enabling the automatic determination of the number of topics based on data distribution without requiring pre-specification. Furthermore, BERTopic applies class-based TF-IDF weighting to extract representative keywords for each topic after clustering. This approach offers several advantages: it performs well on short texts or datasets with sparse co-occurrence patterns, effectively handles polysemy and synonymy, and is particularly suited to languages like Korean where flexible word order and contextual cues are critical. In this study, the parameters of HDBSCAN, such as minimum cluster size, were fine-tuned to achieve a reasonable granularity of topics.

4. Results

This study applied BERTopic, a transformer-based topic modeling technique that leverages contextual embeddings and clustering algorithms [14]. This approach enables finer-grained semantic differentiation, particularly useful for identifying discursive nuances in shorter texts such as news articles. Based on document similarity and HDBSCAN clustering, 13 interpretable topic clusters were extracted in [Table 1].

Topic 1 includes keywords such as content, G-Star, Nexon, mobile, global, and Netflix, reflecting firms' efforts to position themselves within the global gaming and content market by leveraging

cross-platform strategies, international media partnerships, and regulatory awareness. This suggests that content strategies are increasingly embedded in transnational narratives that blend entertainment, policy compliance, and platform convergence.

Topic 2 includes terms like education, culture, school, webtoon, and animation, indicating a growing alignment between game content and educational or civic ecosystems. Firms appear to be extending their IPs into academic, cultural, and tourism spaces, thereby redefining gaming as a medium of informal learning and cultural dissemination.

Topic 3 includes words such as documentary, film_festival, rehighlight, and international, illustrating a strategic use of retrospective media and global storytelling formats to elevate the visibility of gaming brands. Firms are increasingly curating their histories and user experiences to align with international cultural circuits and revive legacy content.

Topic 4 includes keywords such as China, myth, movie, and system, highlighting efforts to localize content and embed culturally specific motifs into media products tailored for the Chinese market. These narratives reflect the importance of synchronizing storytelling with localized values, user preferences, and regulatory infrastructures.

Topic 5 includes terms such as license, emerging, first_person, bridgehead, and Eastern Europe, showing how firms articulate strategies for entering new markets through licensing deals, genre localization, and first-mover framing. This implies that global expansion is not just geographic, but narrative-constructed through genre identity and regional branding.

Topic 6 includes words like promotion, advertising, internet, and fantasy IP references such as Ragnar, capturing how marketing strategies are increasingly centered around high-impact storytelling and IP-driven entertainment. Firms are actively crafting mythological or cinematic identities that traverse traditional advertising into immersive, transmedia promotion.

Topic 7 includes keywords such as illegal, crackdown, baccarat, and alias, pointing to media narratives centered on illicit gambling practices and regulatory enforcement. In this context, such discourses operate as a reputational contrast that compels legitimate game companies to foreground transparency, institutional compliance, and ethical platform design as core elements of their strategic positioning.

Topic 8 includes terms such as region, stadium, event, and Sparta, emphasizing region-based sports, physical game initiatives, and urban development projects. This suggests that gaming firms are partnering with local governments and civic organizations to embed innovation within physical infrastructure and event-driven community narratives.

Topic 9 includes words such as developer, conference, broadcast, knowhow, and change, reflecting how knowledge-sharing and community participation are becoming central to firms' innovation strategies. Developer conferences are not only technical gatherings but narrative events that frame openness and co-creation as industry values.

Topic 10 includes keywords such as culture, revision, standard, review, and Vietnam, indicating firms' engagement with cultural policy and international standard-setting efforts. These narratives demonstrate how companies respond to and influence evolving institutional frameworks by embedding themselves into policy revision and regulatory reform discourses.

Topic 11 includes terms like premium, maximize, technology, and value, representing a strategic turn toward high-end branding and technological distinction. Firms are constructing narratives of product excellence, exclusivity, and performance, positioning themselves as premium innovation leaders in an increasingly saturated market.

Topic 12 includes keywords such as Kakao, investment, venture, penetration, and healthcare, reflecting a broader tech-venture discourse in which game firms expand into adjacent industries such as wellness and data-driven services. These narratives connect entrepreneurial identity with market diversification and strategic investment appeal.

Topic 13 includes names such as Krafton, Netmarble, Wemade, and terms like system, genre, and turbulence, pointing to the dynamic interplay among major industry actors. The discourse reflects how genre evolution, technological platforms, and organizational alliances are central to shaping competitive positioning and ecosystem orchestration.

These findings reinforce the idea that innovation in the online game industry is not confined to core product development. Instead, it involves the orchestration of multi-layered innovation structures that span technology, policy, culture, and user behavior-aligning with Autio's (2022) orchestration framework and Shen et al.'s (2024) ecosystem practice typology.

[Table 1] Topic Modeling Analysis Using BERTopic

	Keywords
1. Global Gaming & Content Market	content, gstar, Nexon, mobile, global, world, growth, regulation, Netflix, china
2. Edu-Cultural Content Ecosystem	education, culture, content, school, academy, webtoon, physical_education, animation, tourism, linkage
3. Global Media Rehighlighting Trends	documentary, Nexon, film_festival, unique, international, within_year, birth, rehighlight, user
4. Chinese Cultural Media	china, movie, billiards, myth, content, culture, system, video, content

5. Global Game Market Entry Strategy	global, license, emerging, bridgehead, first_person, eastern_europe, gray, adventure
6. Tech & IP-Driven Entertainment Marketing	loke, ragnar, viti, gra, enter, promotion, internet, gstar, advertising
7. Regulatory Risk and Illicit Platform Narratives	operation, illegal, crackdown, fine, guest, mother, gambling, alias, baccarat, method
8. Regional Sports & Event Development	dports, region, sparta, eternal, return, stadium, establishment, event, plan, coding
9. Developer Conference & Knowledge Sharing	conference, developer, parallel, broadcast, share, presenter, knowhow, knowledge, open, change
10. Cultural Policy & Standardization Revisions	culture, terms, system, revision, reflection, vote, standard, review, Daejeon, vietnam
11. Technology-Driven Premium Brand Strategy	ambiguous, plan, self, maximize, premium, technology, locus, value, establish
12. Tech Venture Growth & Market Penetration	Kakao, investment, appearance, venture, health, care, overall, penetration, new
13. Major Game Companies & Market Dynamics	Krafton, Nexon, vidia, system, Wemade, room, axis, turbulence, Netmarble, genre

Topics	P		Topics	P		Topics	P		Topics	P		Topics	P		Topics	P
1 content	0.024	3	Nexon	0.147	5	bridgehead	0.093	7	alias	0.194	9	open	0.21	12	kakao	0.173
1 gstar	0.023	3	film_festival	0.102	5	eastern_europe	0.092	7	baccarat	0.192	9	change	0.183	12	investment	0.121
1 nexon	0.023	3	unique	0.101	5	gray	0.092	7	method	0.181	10	culture	0.072	12	appearance	0.084
1 mobile	0.021	3	international	0.095	5	adventure	0.092	8	sports	0.227	10	terms	0.067	12	venture	0.079
1 global	0.021	3	within_year	0.088	5	first_person	0.091	8	region	0.2	10	system	0.067	12	health	0.076
1 world	0.021	3	birth	0.082	6	loke	0.066	8	sparta	0.117	10	revision	0.06	12	care	0.075
1 growth	0.02	3	rehighlight	0.082	6	ragnar	0.066	8	eternal	0.107	10	reflection	0.054	12	overall	0.072
1 regulation	0.019	3	user	0.074	6	viti	0.06	8	return	0.107	10	vote	0.052	12	penetration	0.072
1 netflix	0.018	4	china	0.072	6	gra	0.06	8	stadium	0.093	10	standard	0.051	12	new	0.071
1 china	0.017	4	movie	0.049	6	enter	0.048	8	establishment	0.092	10	review	0.044	13	Krafton	0.546
2 education	0.035	4	billiards	0.042	6	promotion	0.045	8	event	0.089	10	daejeon	0.04	13	Nexon	0.083
2 culture	0.034	4	myth	0.035	6	internet	0.042	8	plan	0.088	10	vietnam	0.04	13	vidia	0.078
2 content	0.028	4	wukong	0.034	6	gstar	0.039	8	coding	0.087	11	ambiguous	0.222	13	system	0.078
2 school	0.021	4	content	0.032	6	advertising	0.037	9	conference	0.582	11	plan	0.088	13	Wemade	0.056
2 academy	0.02	4	culture	0.025	7	operation	0.276	9	developer	0.265	11	self	0.086	13	room	0.049
2 webtoon	0.02	4	system	0.024	7	illegal	0.244	9	parallel	0.236	11	maximize	0.069	13	axis	0.049
2 physical	0.02	4	video	0.024	7	crackdown	0.219	9	broadcast	0.234	11	premium	0.067	13	turbulence	0.049
2 animation	0.019	4	content	0.023	7	fine	0.21	9	share	0.233	11	technology	0.064	13	Netmarble	0.048
2 tourism	0.017	5	global	0.022	7	guest	0.21	9	presenter	0.227	11	locus	0.062	13	genre	0.047
2 linkage	0.016	5	license	0.103	7	mother	0.206	9	knowhow	0.218	11	value	0.057	13	Wemade	0.056
3 documentary	0.176	5	emerging	0.096	7	gambling	0.202	9	knowledge	0.213	11	establish	0.057			

[Fig. 1] Bertopic-based Topic Modeling (P=Probability)

In addition, [Fig. 1] shows the top-ranked keywords associated with each of the 13 strategic topics extracted using BERTopic. Each column corresponds to a topic cluster, with keywords ranked by their probability (P) scores, reflecting their semantic importance within that cluster. For example, Topic 1 emphasizes global expansion and content growth through keywords like ‘global’ and ‘Nexon’, while Topic 2 reveals a growing focus on edu-cultural integration with terms such as ‘education’ and ‘webtoon’. Notably, Topic 7 underscores regulatory risks with high-weight terms like ‘illegal’ and ‘crackdown’, signaling firms’ increasing attention to compliance and platform governance. These keyword

distributions (with P-values ranging from 0.06 to 0.21) reveal how game companies are simultaneously pursuing market penetration, technological branding, and policy responsiveness. This suggests a multi-layered strategic orchestration across emerging digital ecosystems.

5. Discussion

This paper traces the strategic evolution of the online gaming industry while highlighting how leading firms respond to fast-changing technological and institutional landscapes. Importantly, the emergence of topics such as ‘Tech & IP-Driven Entertainment Marketing’ and ‘Technology-Driven Premium Brand Strategy’ aligns with the broader industry shift toward platform convergence—where gaming firms are no longer standalone publishers but orchestrators of transmedia ecosystems that blend gaming, streaming, and branded content. Similarly, topics like ‘Regional Sports & Event Development’ reflect the commercialization of esports, wherein game companies collaborate with cities, schools, and media outlets to institutionalize gaming as both a cultural and economic activity. Meanwhile, the appearance of educational, metaverse-related, and cross-industry themes in the Topic 2 and Topic 5 indicates a growing orientation toward metaverse infrastructure, where interoperability, persistent identity, and real-time engagement become strategic imperatives. These trends illustrate that strategic orchestration is no longer confined to internal resource mobilization but now involves active signaling, narrative control, and stakeholder coordination across domains.

Managerially, our findings provide a roadmap for anticipating and shaping emerging competitive logics. By monitoring theme trajectories and understanding their interdependencies, executives can better align innovation strategies with evolving user expectations and policy environments—especially in anticipation of cross-sector opportunities like edu-gaming platforms, hybrid physical-digital festivals, or gamified wellness ecosystems.

6. Conclusion

This paper investigates the strategic evolution of the digital content industry, highlighting how firms navigate rapid shifts in technology, regulation, and market expectations [15][16]. Focusing on online gaming as a representative case, we analyze industry discourse to uncover emergent patterns in innovation orchestration. This study applied BERTopic to a corpus of 1,054 news articles (2022-2025) to trace the strategic evolution of the online gaming industry. By leveraging contextual embeddings and HDBSCAN clustering, we identified thirteen distinct thematic strands that reveal how leading firms

orchestrate innovation across four interdependent domains-technological convergence, global expansion, institutional alignment, and cross-sector integration. Further, we distilled five core orchestration practices (strategic design, relational management, resource integration, technological leveraging, and innovation facilitation) that collectively underpin firms' capacity to align internal capabilities with external pressures and drive sustained competitive advantage.

Methodologically, our work demonstrates the efficacy of embedding-based topic modeling for longitudinal strategic analysis in fast-moving digital ecosystems. Unlike traditional LDA, BERTopic captures fine-grained semantic shifts and emergent narratives-such as IP-driven promotion and regulatory compliance-that are critical to understanding platform firms' public signaling. Theoretically, we extend dynamic capabilities and institutional perspectives by illustrating how orchestration transcends internal resource reconfiguration to encompass proactive ecosystem shaping through market signaling and stakeholder engagement. Practically, our findings offer a diagnostic framework for executives and policymakers: monitoring thematic trajectories enables anticipation of emerging opportunities and threats, more effective resource allocation, and targeted communication strategies to secure legitimacy and foster ecosystem resilience.

Several limitations invite further investigation. First, our reliance on English-language news sources may underrepresent region-specific discourses, particularly in non-Anglophone markets. Second, while topic prominence suggests strategic emphasis, causal links between thematic shifts and firm performance remain unexplored. Third, the effectiveness of BERTopic is partially constrained by topic coherence sensitivity and limited temporal resolution, which may obscure fine-grained transitions in discourse over shorter time spans. To address these issues, future research could integrate hybrid approaches-combining embedding-based models with rule-based or supervised classification-to improve semantic precision. Finally, orchestration practices may vary across platform life cycle stages; future studies could compare nascent versus mature ecosystems or extend the analysis to multilingual corpora and social media discourse. By addressing these methodological and empirical gaps, scholars can deepen our understanding of how platform firms orchestrate multi actor innovation and adapt to ever-evolving digital landscapes.

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