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ORIGINAL RESEARCH

Innovating Pharma: Bridging Traditional Acquisition and Emerging Technologies

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Abstract

Objectives: The authors explore how large pharmaceutical corporations may integrate emerging decentralized technologies—such as blockchain and decentralized autonomous organizations (DAOs)—within their merger, acquisition and partnership frameworks, and how these strategies intersect with broader innovation and external sourcing models. In this context, blockchain is considered primarily as an enabling infrastructure for decentralized governance and programmable coordination—supporting mechanisms such as tokenized incentives, auditable decision trails, and new forms of intellectual property (IP) and collaboration structures.
Methods: This study employed a qualitative case study methodology, combining document analysis and semi-structured interviews with internal stakeholders from a leading large-cap pharmaceutical company (herein after "Company"). Participants included executives and professionals from corporate development, scientific research, external innovation, and digital strategy units.
The analysis examined how a large-cap "Company" approaches mergers, acquisitions, and partnerships, and how emerging technologies may influence these frameworks. The study focused on strategy alignment, organisational attitudes towards decentralisation, integration constraints, and perceptions of innovation value along the external sourcing continuum.
Results: Acquisition and innovation strategy by the "Company" is driven by long-term alignment between external opportunities and internal priorities. Over time, the "Company" increasingly turned to external sources of innovation, leveraging technologies to improve innovation scouting, target identification, and operational forecasting. While decentralisation technologies such as DAOs are viewed as promising for early-stage innovation and collaboration, their integration is hindered by legal ambiguity, internal governance rigidity, and unfamiliarity with token-based economics. The "Company" views mergers and acquisitions (M&As) and licensing as critical to sustaining its pipeline, and sees potential for emerging technologies to accelerate preclinical decision-making and improve visibility into academic and biotech ecosystems.
Conclusions: This study contributes insights into how large-cap pharmaceutical firms might adapt their innovation models in response to technological change and external pressures. While established mechanisms such as M&A and partnerships remain dominant, digital and decentralized technologies offer complementary tools for scouting, collaboration, and portfolio expansion.

Plain Language Summary

The authors examine how a top-tier large-cap pharmaceutical company's external innovation framework (spanning mergers and acquisitions (M&A), licensing, and partnerships) interacts with emerging decentralized approaches, particularly blockchain and decentralized autonomous organizations. Using a qualitative case study design, we combine document analysis with semi-structured interviews with seven senior stakeholders across corporate development, R&D, external innovation, and digital strategy. We analyze how strategic alignment is assessed, how decentralization is perceived internally, which constraints shape adoption, and where decentralized approaches are viewed as potentially value-adding along the external sourcing and

partnering process. Findings indicate that acquisition and partnering decisions are primarily guided by long-term fit between external opportunities and internal priorities, with a growing reliance on external innovation supported by digital tools for scouting, evaluation, and forecasting. Decentralized approaches are seen as most relevant for upstream activities, such as early-stage sourcing, distributed evaluation, and ecosystem building, but their adoption is constrained by legal and regulatory ambiguity, entrenched internal governance requirements, and limited familiarity with token-based economic models. Overall, decentralized technologies are perceived as complementary enablers that may strengthen early innovation discovery and ecosystem visibility, rather than substitutes for traditional M&A, licensing, and partnership models that remain central to late-stage development, integration, and market access.

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At the heart of pharmaceutical advancement lies the quest for innovation, traditionally acquired through strategic collaborations, acquisitions, and in-house development. However, the landscape is rapidly changing with the advent of decentralized autonomous organisations (DAOs) and alternative funding mechanisms.[1] In this article, the authors explore this transition, focusing on the unique perspectives of pharmaceutical companies to understand the current state and future possibilities of innovation acquisition and funding.

The pharmaceutical industry is characterised by a dichotomy between patented innovative drugs and generic drugs. While innovative drugs are highly profitable, they require substantial research and development (R&D) investments and involve significant risks, whereas generic drugs face intense competition and strong cost pressures.[2] Despite these challenges, major pharmaceutical companies such as Novartis, Pfizer, and Roche continue to prioritise R&D for patented drugs.

However, R&D in the pharmaceutical sector faces major hurdles, including escalating development costs, which have reached an average of $2.6 billion per approved drug,[3] and declining R&D productivity worldwide. The growing availability of generics has further increased price pressure on branded drugs.

Traditionally, pharmaceutical companies conducted R&D in-house, but rising costs, complexity, and the limited number of blockbuster products have rendered this model increasingly unsustainable.[4,5]

Technological advances such as molecular modelling, computer-assisted drug design, and next-generation DNA sequencing have reduced early-stage research costs, enabling smaller teams to advance drug candidates into clinical trials more affordably.[6–8] As a result, mergers and acquisitions (M&As) have become central to pipeline expansion, facilitating partnerships and providing exit opportunities for early investors.[9,10] In biotech-driven M&As, smaller firms often develop drug candidates and transfer rights or partner with large pharmaceutical companies responsible for clinical development and commercialisation.[11,12] The complementary strengths of biotech firms' innovation and big pharma's market access have fuelled a recent surge in M&A activity due to the escalating cost of drug development, the requirement for scale, and the need to access new technologies, reshaping the industry into a pyramid structure with many molecule developers at the base and fewer commercialisers at the top.[13–16]

The authors aim to bridge the gap between traditional innovation acquisition methods and the transformative potential of emerging technologies in the pharmaceutical industry. By offering an in-depth comparison of the exclusive, internal perspectives of pharmaceutical companies, this research intends to provide valuable insights into how the industry can navigate the rapidly evolving dynamics of a complex landscape and the alternative strategies offered by technological advancements. This study aims to deliver valuable insights to both academia and industry practitioners. For scholars, it adds to the limited but growing literature on the role of emerging decentralized technologies in the pharmaceutical industry's M&A landscape in particular. For practitioners, it offers a comprehensive understanding of the ongoing shifts in the pharmaceutical industry's M&A strategies and the potential role technology-enabled open innovation can play in navigating these changes.

Background

Historical Overview

Since the emergence of modern biotech in the 1970s, drug innovation has increasingly been driven by biotech and small pharmaceutical firms, which account for two-thirds of approved new molecular entities and nearly 70% of the global development pipeline.[17] Large pharmaceutical companies have primarily acted as acquirers of external innovation, with 74% of new drugs originating outside Big Pharma.[12] This model has fuelled sustained M&A activity since 1988, leading to industry consolidation[18] and preclinical licensing deals considerably decreasing.[19] Rising development costs, competitive pressure from generics, the relentless pursuit of innovative technologies, and the need for global scale have further intensified R&D costs[12] and

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deal-making, with peaks in the mid-2010s and renewed activity in 2022.[14,15,20,21]

Drivers Behind M&A

The interaction between biotech innovation and traditional pharmaceutical models has strongly shaped the M&A landscape. Despite biotech growth, large pharmaceutical companies face declining internal R&D productivity, as rising development costs have not translated into proportional increases in approvals, patents, or revenues. Stricter regulatory requirements, higher patient recruitment costs, and greater clinical trial complexity have contributed to this decline.[12]

In response, pharma and biotech companies have increasingly turned to collaboration to reduce costs through economies of scale and to replenish pipelines with innovative, cash-generating drugs.[22] Value creation strategies have included a focus on high-margin specialty drugs, investments in advanced technologies such as gene therapy and personalised medicine, and partnerships with academic institutions and startups.[23] Evidence suggests that acquisitions aligned with a company stated partnering strategy tend to generate higher deal values.[10]

M&As offer opportunities for market expansion, portfolio diversification, and realisation of economies of scale, though they also carry significant risks.[24] Key drivers include rising development costs, the need for economies of scale, access to cutting-edge technologies, and competitive pressure from biotech firms and generics.[15] Consequently, firms increasingly rely on external innovation through acquisitions or partnerships, engaging in crowdfunding or opening up their R&D models.[21,25,26]

Impacts of M&A on Innovation

The pharmaceutical industry's cyclical M&A activity contributes to enhancing healthcare. With more entities involved in R&D, we can see an increase in the probability of new treatment discoveries. More importantly, M&As might potentially speed up patient access to these novel treatments by capitalising on Big Pharma's commercialisation expertise.[6]

While M&As demonstrate a substantial influence on the industry, the impact on pricing, innovation, and competition is complex. The outcome of these M&As relies on numerous variables, such as the distinct characteristics of the companies involved, the prevailing regulatory environment, and the existing market conditions.[27] On one hand, M&As can lead to cost efficiencies, indirectly benefiting consumers with lower prices. For instance, companies can consolidate their manufacturing operations following an M&A, leading to reductions in production costs. Furthermore, the pooling of resources can enhance the pace and efficiency of new drug development.[27]

The interplay between biotech and large pharmaceutical companies, despite their inherent differences, can be beneficial for both. Biotech firms bring to the table innovative drug solutions, while big pharmaceutical companies bring the necessary resources and expertise to commercialise these innovations. This symbiosis can lead to the development of novel, effective treatments for a multitude of diseases.[13]

Jones et al.[28] examined the effects of M&As on R&D decision-making. M&As can influence resource allocation for R&D, acquisition of new technologies, and access to new markets. In each case, they can contribute positively by broadening the scope and scale of operations.[28]

This influence also extends to financial markets. Strong evidence points to a favourable stock market reaction when the focus of an M&A is on sales synergies. This outcome is particularly pronounced when acquirers possess strong liquidity. Moreover, acquirers tend to benefit if the targets have adequate liquidity as well. However, cost efficiency does not appear to significantly impact the stock markets' reaction, suggesting a sceptical view of cost synergies as a driving motivation for successful transactions in the pharma and biotech industry.[22]

The impacts of M&As on innovation in pharmaceuticals showcase the complexities and interconnectedness of the industry's many facets. While the benefits and challenges are clear, a deeper understanding of the nuanced relationships between these factors is necessary for driving further innovation. As the industry evolves, such comprehension will be key to harnessing M&As as a powerful tool for advancing innovation quickly and effectively.

Challenges and Limitations of M&A

One downside to M&As is the potential for increased consumer prices, as the merger of two major competitors can reduce the competitive landscape and potentially drive prices up. This consolidation can also lead to decreased innovation due to the reduction in the number of entities engaged in developing new drugs.[27]

Small and medium-sized (SMEs) biotech companies face their own set of struggles. These include difficulty accessing capital for drug development and commercialisation, a deficit in expertise across areas such as drug discovery, clinical development, and regulatory affairs, and a lack of necessary networks for reaching potential investors, partners, and customers.[10] Overcoming these challenges often requires partnerships with larger pharmaceutical entities, which can provide SMEs with access to capital, expertise, and networks. Government support can also be crucial, offering financial assistance and regulatory relief.

Managing change in biotech M&As presents another formidable challenge. Cultural integration, employee retention, and technology integration can be complex and time-consuming tasks.[24,29,30] This complexity is heightened when considering collaborations between biotech and big pharma, where differences in cultures, goals, and timelines can make effective collaboration difficult.[13]

Furthermore, M&As can be highly disruptive, potentially causing delays in research projects and loss of valuable intellectual property. They may also lead to loss of focus in R&D and increased bureaucracy, complicating decision-making processes.[28]

Ascher et al.[31] identify four key challenges facing the pharmaceutical industry: rising costs of drug development, declining R&D productivity, increased competition from generic drugs, and an increasingly complex regulatory environment. The authors assert that the traditional approach to M&A, focusing on acquiring companies with complementary products or technologies, no longer effectively addresses these challenges.[31]

Finally, some argue that mergers can disrupt "innovation markets," reducing future product development incentives. Consolidation can negatively impact innovation activities within newly merged firms, often leading to reduced R&D expenditures, fewer R&D projects, and fewer new patents. However, these reductions can be indicative of efficiency gains from streamlined operations and economies of scale.[12]

Overall, M&As in pharmaceuticals present numerous challenges and limitations. Their impact on competition, innovation, and collaboration requires careful consideration and strategic planning. Only through such careful planning can the potential benefits of M&As be realised without compromising the broader goals and values of the industry.

Future Directions and Predictions

The future pharmaceutical M&A landscape is shaped by sustained healthcare demand driven by aging populations, chronic diseases, and rising affluence in emerging markets, alongside rapid technological advances such as gene therapies, CAR-T cell therapy, and artificial intelligence (AI).[16] These forces place continuous pressure on biopharma companies to renew their R&D pipelines, supporting a continued tendency toward consolidation due to high development costs, the need for scale, and access to new technologies. However, M&A success is uncertain and requires careful risk–reward evaluation.[29,30]

Market outlooks predict continued M&A activity, though regulatory complexity and economic uncertainty may constrain large transactions.[15] External and open innovation remain attractive strategies, enabling risk sharing and faster development, provided intellectual property, cultural integration, and uncertainty risks are effectively managed.[4,21,26] Novel M&A approaches, focusing on innovation-driven value creation, scale and capability building, and risk management, are emerging. They emphasise the need for new drugs that address unmet medical needs and are superior in efficacy or safety compared to existing treatments. Risk management should be meticulously carried out, evaluating M&A opportunities and handling the associated risks of drug development and commercialisation.[31]

While rising costs and global uncertainties have shifted preferences toward partnerships, consolidation does not necessarily hinder innovation, as much of it originates outside large pharmaceutical firms and may even be enhanced through better support and resource allocation.[12,14] Increased regulatory scrutiny, particularly for cross-border deals, is expected to further complicate future transactions.[16]

Decentralized Technologies

Decentralized technologies such as blockchain, distributed ledgers, and DAOs enable secure, transparent, and trust less collaboration by removing the need for centralised intermediaries.[32] These technologies facilitate data provenance, automate complex transactions, and support novel governance models, making them particularly relevant for the highly regulated and partnership-dependent pharmaceutical sector.[1,33]

To date, within the pharmaceutical domain, decentralized technologies have predominantly been discussed in relation to specific application areas. In particular, they have been framed either as information management systems, commonly referred to as healthcare data management systems or platforms, or as mechanisms for asset ownership, or as means to enable the contribution of the many, promote transparent decision-making, and foster a more productive R&D environment.[1,34–37] They can, however, also be extended to supply chain management, patient safety, improving regulatory compliance, streamlining clinical trials, and reducing the prevalence of counterfeit drugs.[38] In this context, their value lies in their qualities in terms of data transparency, traceability, immutability, auditability, data provenance, flexible access, trust, privacy, security, and reliability.[34,35,37]

Among decentralized technologies, DAOs are global communities of individuals with shared goals, whose members can propose ideas or investments, discuss them transparently, and vote on decisions that govern funds, operations, governance, and even changes to the open-source code, with their blockchain-related tokens.[1] DAOs are becoming relevant not only in the blockchain economy[39] but also in the "real" economy. They can autonomously select and invest in start-ups and innovation and manage their development,[40] operate as crowdfunding or ride-sharing platforms,[41] and are expected to reduce

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communication, management, and collaboration costs by replacing traditional hierarchical structures with decentralized governance.[42]

Referring to the pharmaceutical and life sciences context, some studies examine the emergence and role of DAOs. At a structural level, Savioz and colleagues[43] contend that recent trends in DAO adoption within the pharmaceutical sector are driven by difficulties in coordinating capital and resources, restrictive intellectual property regimes, and disruptions to traditional governance structures. The authors[1] examined the potential of DAOs as alternative mechanisms for funding and governing life sciences research through the case of VitaDAO. The study reveals that DAOs can improve transparency, align incentives, reduce agency and coordination costs, and foster open and collaborative R&D through token-based governance and intellectual property (IP) tokenisation. At the same time, it highlights key challenges, including regulatory uncertainty, security risks, coordination difficulties, and participation biases, suggesting that DAOs are more likely to complement rather than replace traditional pharmaceutical and venture capital models. Along similar lines,[43] analyses the combined impact of AI and DAOs on life sciences R&D financing, arguing that the integration of AI's predictive and analytical capabilities with DAO governance can enhance efficiency, transparency, inclusiveness, and risk assessment. The study emphasises both the transformative potential of this integrated approach and persistent barriers to adoption, such as regulatory uncertainty, technical complexity, and security concerns.

DAOs are also being explored across a range of application domains in healthcare. These DAOs have been proposed as mechanisms for settling healthcare-related disputes involving doctors, patients, and insurance providers.[44] Another prominent application concerns civic access to medical data, where individuals retain control over their personal health information and selectively share it with authorised stakeholders through DAO-enabled governance frameworks.[45] In this context, increasing data breaches and compliance failures with data protection regulations have further motivated researchers to investigate DAOs as collective alternatives to traditional top-down models of health data governance, engaging the public in the co-design and stewardship of health data infrastructures.[46] Additional examples reported in the literature[47] include regulatory-compliant patient data analysis,[48] collaborative cancer detection and COVID-19 medical imaging across hospitals, multi-institutional tumour analysis,[49] and collaborative drug discovery initiatives that allow pharmaceutical companies to jointly develop models without disclosing sensitive proprietary data.[50]

Current Gaps and Research Goal

This literature review shows a gap in understanding the potential role of emerging, decentralized technologies in fostering open innovation and collaboration.

Given this context, the present study is positioned at the intersection of M&A activities, innovation dynamics, and emerging technologies within the pharmaceutical industry. This study aims to explore how these technologies can potentially accelerate innovation in the pharmaceutical sector by enhancing and boosting M&A and licensing processes.

Our goal in this research is then two-fold. Firstly, we aim to better understand the key drivers behind M&A activities in the pharmaceutical industry and the influence these drivers exert on innovation and value creation (research question [RQ1]). We are particularly interested in probing the complexities inherent in these strategic decisions, exploring not only the apparent motivations for consolidation but also the undercurrents of risk management, IP protection, and cultural integration.

Secondly, we seek to shed light on how emerging decentralized technologies, such as DAOs, are perceived and expected to be utilised in the context of M&A to accelerate and improve outcomes, with a focus on innovation (RQ2). The significance of this research is further emphasised by the shifting dynamics within the pharmaceutical industry, where open innovation, partnerships, and technological advancements are shaping the future.

Methods

To address our RQs, we employed a qualitative case study methodology[51,52] to investigate how a leading entity among large-cap pharmaceutical corporations, hereafter "Company," handles external early innovation and the acquisition of partnerships around this innovation. We chose a holistic single case study due to "Company's" significance in the industry, with the "Company" serving as our unit of analysis. Being one of the few large-cap pharma corporations where end-to-end research, development, and go-to-market processes are observed across a broad portfolio, the "Company" spans five different technology platforms, from chemicals and biologics to emerging domains such as radiopharmaceuticals, pharmaceuticals, and gene therapies.

By conducting semi-structured interviews with pharmaceutical executives and analysing relevant public documents, we sought to gain an in-depth understanding of "Company's" operations, governance, and decision-making processes related to mergers, acquisitions, and licensing of external innovations. This method allowed us to gather insights from key stakeholders involved in these activities, as well as from those leading in the field of emerging technologies. These perspectives provide valuable understanding of how these technologies might

enhance the processes of external innovation acquisition and partnerships.

To gather data, we combined public documents about the "Company" with semi-structured in-depth interviews. Semi-structured interviews with key "Company" executives served as the primary method of data collection for this case study. These interviews allowed for a flexible and in-depth exploration of the participants' experiences, opinions, and perspectives related to the company and its operations in the space. We conducted approximately 60-min interviews with seven participants, who were selected based on their roles and involvement with external innovation, M&A, licensing, and partnerships. The participants were engaged and interviewed between the third and fourth quarters of 2023 and the first and second quarters of 2024. We offered alternative time slots for video-call interviews to the selected interviewees, resulting in a non-hierarchical order for the interviews that did not necessarily follow the organisation's structure or a predetermined order among different working groups. Before each interview, we sent a research brief to each participant, including a recording permission form and an overview of the study's objectives.

The interviews were conducted remotely via video calls. They were recorded, transcribed verbatim, and analysed using thematic analysis. This analysis incorporated deductive and inductive approaches, referencing existing literature on M&A, licensing, open innovation, and partnership in pharmaceuticals, while also allowing new themes to emerge from the data. An initial coding framework was developed based on the RQs and the background literature review and subsequently refined through iterative assessment of empirical material.

Coding was conducted through multiple cycles, during which emerging themes were continuously compared across interviews to ensure internal consistency and conceptual coherence. Theme refinement was supported by repeated re-examination of the underlying transcripts, enabling validation of codes against the original empirical material rather than relying on single excerpts or individual accounts.

To enhance analytical rigour and reliability, AI-enabled qualitative analysis tools were used to support transcript preprocessing, code organisation, and preliminary theme clustering. These tools were employed as decision-support mechanisms rather than as autonomous analytical agents, with all final coding decisions, theme definitions, and interpretive judgements remaining under the control of the researchers.

The use of AI-assisted analysis facilitated systematic comparison across interviews, reduced the risk of omission in early-stage evidence mapping, and supported transparency in the iterative refinement of themes, without replacing established qualitative interpretive practices. Specifically, commercially available large language model–based tools were used to support transcript preprocessing, semantic grouping, and cross-interview comparison.

We identified and coded key themes and patterns in the data related to the RQs and objectives, refining initial codes through an iterative process as new data was collected and analysed. The emergent themes and patterns were organised and synthesised into a narrative describing "Company's" current approach and expectations towards external innovation, its impact on the pharmaceutical industry, and the challenges and opportunities associated with emerging decentralized technologies.

Ethical considerations were meticulously observed throughout the study. All participants gave their written consent prior to the start of the interviews. They were fully informed about the study's objectives, their right to withdraw at any time, and the confidentiality of their responses.

In addition to reporting the empirical themes emerging from the interviews, the analysis also discusses a conceptual framework that reflects how decentralized technologies and governance approaches, as observed and discussed by participants, could complement established external innovation processes in the pharmaceutical industry.

Our panel of seven interviewees from "Company," all holding executive and leadership roles on a global scale, confirmed their extensive and diverse involvement in external innovation, licensing, acquisitions, partnerships, and the integration of these activities. This confirmation is critical, as it validates the selection of our panel for addressing our RQs. Each interviewee provided insights into their specific roles and experiences, demonstrating a broad and comprehensive engagement with external innovation through mergers, acquisitions, and partnerships.

Interviewee 1: This individual provides commercial and strategic input into "Company's" R&D pipeline up to Phase II. With responsibility transitioning thereafter to U.S. and international teams, Interviewee 1 has participated in numerous commercial evaluations for business development and licensing (BD&L) as well as M&A over the past 8 years. This extensive experience highlights a deep involvement in evaluating and integrating external innovations within "Company."

Interviewee 2: As the head of search and evaluation for immunology, this interviewee has been with the "Company" for nearly 12 years. Exposure to external innovations began from day 1 and evolved from university-led innovations to a focus on BD&L in recent years. Reviewing several external opportunities daily underscores a continuous and intensive engagement with external innovation.

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Interviewee 3: Over the past 5 years, this individual has been actively involved in M&A, particularly in key therapeutic areas, with broader responsibilities in BD&L and search innovation activities demonstrating a critical role in facilitating and integrating external innovations into the "Company."

Interviewee 4: Part of the Strategy, Pipeline Operations, and Project Management team, this interviewee focuses on non-drug projects globally. Over the last five and a half years, this person has overseen the development of a non-drug portfolio framework aimed at enhancing operational efficiencies, speeding up processes, and reducing redundancies. This role also involves managing internal innovation and integrating internal teams, illustrating a broad engagement with both internal and external innovation activities.

Interviewee 5: Working within the Academic Partnership and Leading Innovation team, this individual focuses on establishing early strategic partnerships with academic institutions. With 18 years of experience as a drug hunter, this interviewee now facilitates collaborations that can inform potential acquisitions, highlighting a strategic facet of external innovation efforts for the "Company."

Interviewee 6: As Director of Operational Excellence in Global Drug Development, this interviewee has been in the current role for 3 years, following 5 years as an integration lead. Experience with partnerships, integrations, and collaborations with external companies showcases a strong background in managing and integrating external relationships within the "Company."

Interviewee 7: The Director of Finance for Business Development and Licensing and M&A, this interviewee focuses primarily on in-licensing and out-licensing activities rather than traditional M&A. This role emphasises the financial and strategic aspects of external collaborations, contributing a critical perspective on the economic viability and strategic alignment of potential partnerships and acquisitions.

In summary, the panel's collective experience underscores a robust and integrated approach to external innovation, M&A, and licensing at the "Company." Each interviewee brings a unique perspective and set of experiences, demonstrating the strategic importance of these efforts in driving growth and innovation for the "Company." This diversity and depth of experience among the interviewees validate the selection of our panel and ensure that they are well-equipped to address our research questions comprehensively.

Results and Discussion

This study utilised a qualitative case study approach to deeply explore the "Company's" strategies and expectations regarding external innovation. The analysis draws on empirical material collected through semi-structured interviews and document analysis and is grounded in systematically coded qualitative data, synthesised at the thematic level. By analysing and synthesising the emergent themes and patterns, we have crafted a detailed narrative that outlines the "Company's" methods for engaging with external innovation, its influence on the pharmaceutical industry, and the opportunities and challenges posed by emerging decentralized technologies. Where relevant, findings are interpreted in light of existing literature on pharmaceutical innovation, M&A, and emerging technologies, as framed in our background literature review. In Table 1, we provide an overview of these as derived from the empirical analysis. The following sections present these findings, offering key insights into how the "Company"

Table 1. Overview of emergent themes from the case study on external innovation and M&A strategies*

Theme	Emergent themes	External innovation
Theme 1	Strategic drivers and processes in acquiring external innovation.	Strategic alignment, commercial viability, and scientific merit guide the acquisition of external innovation.
Theme 2	Evolution of drivers and processes in acquiring external innovation.	Processes have evolved with technological advancement, emphasising proactive engagement and broader integration.
Theme 3	Integration of external innovation and its impact.	Integration challenges include capability building and cultural alignment but enhance innovation capacity.
Theme 4	Measuring the value delivered from acquisitions and partnerships.	Evaluation includes financial performance, strategic fit, and retrospective comparison of projections versus outcomes.
Theme 5A	Role of emerging technologies in facilitating innovation (non-prompted)	AI and other digital technologies enhance early-stage innovation, though their impact is still difficult to quantify.
Theme 5B	Role of emerging technologies in facilitating innovation (prompted discussion on decentralized technologies).	Decentralized technologies like DAOs hold promise but face adoption barriers in highly regulated industries.
Theme 6	Future trends in pharma innovation, acquisition, and licensing.	External innovation via M&A will become more prevalent as biotech struggles increase industry reliance.

DAO: decentralized autonomous organisations; M&A: mergers and acquisitions.

*Themes are derived from qualitative analysis of semi-structured executive interviews and triangulated with desk research, including investor communications and publicly available corporate materials. AI-assisted tools supported transcription coding and thematic clustering. AI: artificial intelligence.

is navigating the dynamic landscape of pharmaceutical innovation and the implications of these practices for innovation strategy and value creation, as reflected in interviewee accounts and practices.

Theme 1: Strategic Drivers and Processes in Acquiring External Innovation

The acquisition of external innovation at the "Company" is driven by a strategic vision that aligns with the "Company's" long-term goals and enhances its portfolio. Interviewees consistently emphasised that this vision is articulated through medium- to long-term strategic planning cycles, outlining the company's aspirations for the next 5, 10, or 15 years, and is translated into focused disease areas to prioritise investments. The "Company" assesses trends and emerging technologies to determine whether to invest early or wait until more data are available, based on scientific maturity, competitive intensity, and strategic fit, as reported by interviewees.

Aligning external opportunities with the company's strategic goals was consistently described as crucial, and this is said to be achieved through various scouting activities. The "Company" embeds its scientists within the industry, attending conferences, engaging in partnering events, and conducting proactive landscaping activities to identify promising innovations. According to interviewees, these activities are complemented by structured internal evaluation processes, ensuring a continuous influx of opportunities that fit the company's strategic needs.

Commercial potential and scientific merit were described as key considerations in evaluating external innovations. Interviewees reported that the "Company" seeks to balance the commercial value of an opportunity with its scientific novelty, particularly looking to fill gaps in its portfolio with novel assets from smaller biotech firms. They also reported the financial viability of potential innovations is rigorously assessed using metrics such as peak sales forecasts and return on investment calculations, which serve as common reference points across evaluation teams.

Geographical and strategic importance also were reported to play a role in selecting partnerships, with a preference for institutions in strategic locations like Switzerland and the U.S. and those specialising in relevant areas such as oncology. Platform technologies are especially valued for their broad applications across various research interests, as they allow the "Company" to leverage capabilities across multiple therapeutic areas rather than single-asset bets.

Overall, the "Company's" approach to acquiring external innovation is described by interviewees as a meticulous process guided by strategic alignment, commercial potential, and scientific value, aimed at ensuring that each acquisition or partnership not only fits within the company's long-term goals but also enhances its ability to remain at the forefront of pharmaceutical innovation.

Theme 2: Evolution of Drivers and Processes in Acquiring External Innovation

The drivers and processes behind acquiring external innovation at the "Company" were reported to have undergone significant changes over time, adapting to technological advancements and evolving strategic priorities. Over the past 7–8 years, the development of new technologies such as RNA and DNA-based approaches has greatly influenced how the "Company" evaluates external opportunities, as repeatedly emphasised by interviewees. These technologies have become more promising and feasible for drug development, leading to a shift in how the company views the external innovation landscape and earlier-stage risk tolerance.

While interviewees consistently reported that the fundamental criteria for evaluating opportunities have remained relatively stable, the emphasis on different factors has shifted over time. This shift is often influenced by the company's strategic focus and its willingness to invest in novel areas that extend beyond its traditional strengths, reflecting changing assessments of risk, maturity, and long-term value creation.

A notable trend in recent years was described as the shift towards embracing external innovations over internal, customised solutions. Interviewees reported that the "Company" has increasingly recognised the value of external expertise, especially in core applications and systems used in drug development. Further, they noted that the Company is moving away from internally developed solutions to adopt industry-standard software-as-a-service platforms for functions such as electronic data capture, clinical trial management, and regulatory information management. This represents a significant change in how the "Company" integrates external technologies, prioritising broader, more standardised solutions over bespoke internal developments to improve scalability and interoperability.

The approach to external innovation was described as becoming more proactive and tailored. Interviewees noted that the "Company" is now actively seeking and evaluating opportunities, with an increased workload reflecting a higher volume of potential acquisitions, collaborations, and licensing deals being assessed. This proactive stance contrasts with earlier practices that were more reactive, focusing predominantly on licensing rather than full company acquisitions. The current strategy was reported as involving a more comprehensive evaluation of companies as potential acquisition targets, indicating a broader and more integrated approach to external innovation.

In summary, the evolution of drivers and processes at the "Company" highlights, according to interviewees,

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a dynamic approach to external innovation, influenced by technological advancements and strategic shifts. The company has transitioned from a reactive to a proactive stance, with an increased emphasis on acquiring entire companies and integrating industry-wide solutions, reflecting a broader and more strategic engagement with external innovation.

Theme 3: Integration of External Innovation and Its Impact

Integrating external innovation into the "Company" involves a complex process that significantly impacts both the acquiring and acquired entities. The primary challenge is the time and effort required to internalise and build expertise in new technologies. Acquiring a new technology often necessitates the development of new capabilities and skill sets within the "Company," as the acquired knowledge must be effectively transferred and embedded across the organisation. This process, although time-consuming, ultimately was reported to enable the company to leverage new platforms to develop a broader range of therapies, thus reaching more patients and addressing diverse diseases.

The integration of external innovations typically enriches internal perspectives around the acquired programmes, enhancing the evaluation of associated risks and potentials. This collaborative synergy was described as accelerating the innovation process, as the "Company" brings its extensive capabilities and infrastructure to bear on converting innovative concepts into tangible programmes. This was reported to fast-track the development of these innovations in some cases but also expand their potential applications.

Competition in the market plays a critical role, especially in high-demand areas. The urgency to acquire the best opportunities drives a strategic focus on M&As, particularly targeting small biotech assets that can be developed and brought to market more efficiently. This competitive landscape incentivises the biotech sector to invest in innovation, knowing that their assets may be acquired by larger pharma companies like the "Company," thereby reinforcing acquisition as a key pathway to scale and market access.

Corporate learning is an ongoing process in integrating external innovations. Interviewees reported that each acquisition is approached with the aim of improving integration strategies, ensuring that new technologies or entities are operationalised swiftly and aligned with the "Company's" standards. This continuous improvement process helps to maximise the value gained from acquisitions, although the integration process itself can present challenges, such as aligning different corporate cultures and operational practices.

Understanding the strategic fit and fully integrating the assets and people of the acquired company is described as a complex and time-intensive process. Initial challenges include discovering additional technologies or elements that need to be incorporated and addressing the concerns of employees about their roles within the new organisation. These uncertainties may temporarily disrupt innovation and daily operations during the integration phase.

The impact on the partner company can be significant, with employees facing uncertainties about their future and the potential loss of jobs. The transition to a larger company with established processes can cause confusion and concern, potentially leading to resistance to collaboration. For the "Company," the challenge was described as laying in fostering a collaborative environment and ensuring the innovation continues to thrive within the new organisational structure.

Interviewees noted that the "Company" often employs a staggered approach to integration, depending on the terms of the acquisition deal. For instance, the partner may continue to run certain phases of product development, such as Phase II clinical trials, before the "Company" takes over in later stages like Phase III. This flexibility was reported to allow for a smoother transition and help maintain the momentum of the development process.

In conclusion, integrating external innovation into the "Company" is a multifaceted process that involves significant time and effort to build new capabilities, align corporate cultures, and manage the transition of employees. While challenging, this integration was described as ultimately enhancing the company's innovative potential and broaden its therapeutic reach, driving forward its mission to improve patient outcomes globally.

Theme 4: Measuring the Value Delivered from Acquisitions and Partnerships

Evaluating the value delivered from acquisitions and partnerships at the "Company" involves a comprehensive approach that includes both financial and non-financial metrics. Success measurement is primarily retrospective and often takes years, especially when evaluating sales and financial performance. Comparing how a product performs in the market against its competition was described as straightforward way to assess its success. This financial evaluation is fundamental, focusing on sales figures and market share to gauge the product's performance relative to initial expectations.

Setting clear success criteria at the outset of a transaction or collaboration is reported to be critical. Both parties must align on what success looks like, allowing for effective measurement of whether the programme meets these defined expectations. This alignment ensures a mutual understanding of the goals and provides a basis for measuring progress throughout the lifecycle of the deal.

In R&D, value is also measured by the innovation generated from the acquisition. Metrics such as the number of new programmes developed from the acquired platform and the efficiency of progressing through clinical development stages were identified as important indicators. The ability to recruit studies quickly and meet clinical endpoints was described as demonstrating the effective integration and utility of the new technology. Continuous assessment over time was emphasised to determine if the clinical evidence supports the initial expectations or if the technology falls short due to efficacy or safety issues.

Reassessing the acquisition post due diligence is another critical aspect of value measurement. Often, elements of the acquired company or technology that were initially deemed less valuable may reveal significant potential upon further investigation. This ongoing reassessment was reported to help uncover additional value that might have been missed during the initial evaluation.

Success measurement typically involves a retrospective comparison of the initial expectations set at the time of the deal with the tangible outcomes achieved. This includes direct financial returns such as sales and revenue, but also strategic benefits that are harder to quantify, such as capability building or platform expansion. Each deal includes a detailed case outlining expected investments, integration costs, development expenses, and projected sales. Comparing actual costs and outcomes against these projections helps assess whether the integration stayed within budget, if development costs were as anticipated, and whether the product launched on time or faced delays that affected sales.

Ultimately, a product is considered successful if it reaches the market with positive results. Expanding the project to other indications or finding additional applications for the acquired technology was described as further enhancing the value derived from the acquisition or partnership.

In summary, the "Company" measures the value delivered from acquisitions and partnerships through a combination of financial performance metrics, strategic alignment, continuous reassessment, and retrospective analysis. This thorough approach was reported to ensure that the company can effectively gauge the success of its external innovation efforts and make informed decisions about future investments.

Theme 5A: The Role of Emerging Technologies in Facilitating Innovation (Non-Prompted)

When asked to list the most valuable and potentially valuable technologies among the trending ones, or those expected to trend in the near future, our interviewees highlighted several emerging technologies. These technologies were described to play significant roles in facilitating early innovation through partnerships, acquisitions, and licensing, thereby enhancing the operational and strategic capabilities of companies like the "Company."

One of the most prominent emerging technologies is AI, which was described as having the potential to revolutionise the process of finding new drug targets, significantly speeding up target identification, which is crucial for the development of new therapies. Artificial Intelligence and machine learning algorithms are particularly useful in areas with extensive data, such as improving the efficiency of clinical studies. These technologies can analyse large datasets to optimise study designs, recruitment, and other critical aspects of clinical trials.

Artificial intelligence-driven technologies also enhance the efficiency of scouting for new innovations by exploring a broader range of opportunities that might be overlooked through traditional methods. This capability could potentially improve the thoroughness and reach of innovation scouting efforts, leading to the identification of promising new assets.

Various other emerging technologies are being integrated into the "Company's" operations, including big data analytics, robotic process automation, digital health platforms, sensor technologies, telemedicine, and decentralized clinical trials. These technologies have been adopted through significant investments and collaborations with major tech companies. While these innovations hold considerable promise, measuring their tangible improvements on operations and financial impact remains a challenge.

In terms of operational applications, AI is currently being used for forecasting sales and marketing expenses, providing valuable insights for future planning. However, its ability to generate novel clinical data or innovations is limited by its reliance on historical data. Despite this limitation, AI's application in financial forecasting demonstrates its utility in operational domains.

In summary, emerging technologies such as AI, and big data analytics were described by interviewees as playing to play crucial roles in facilitating and supporting early innovation at the "Company." These technologies enhance various aspects of the drug development process, from target identification and clinical study optimisation to financial forecasting and strategic planning. Despite the challenges in measuring their direct impact, the integration of these technologies represents a significant step forward in advancing pharmaceutical innovation and maintaining a competitive edge in the industry.

Theme 5B: The Role of Emerging Technologies in Facilitating Innovation (Prompted Discussion on Decentralized Technologies)

When specifically prompted about decentralized technologies, interviewees provided varied insights into their potential roles and the challenges they might face in facilitating early innovation through partnerships, acquisitions, and licensing. These technologies, including DAOs,

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were discussed as emerging tools that could reshape how collaborations and innovation processes are managed in the pharmaceutical industry.

Decentralized autonomous organisations were described by some interviewees as having the potential to accelerate decision-making processes by fostering consensus among a wider ecosystem of innovators. This can be particularly valuable in driving next-generation innovations where multiple stakeholders are involved. However, measuring the success of such collaborations remains a challenge due to the dynamic nature of interactions and shifting strategic priorities among partners.

One promising application of decentralized technologies is in the creation and nurturing of research communities. These technologies were described as potentially able to facilitate large private-public partnerships, bringing together academia, pharmaceutical companies, and other stakeholders to address specific scientific and medical questions. This collaborative approach could serve as the seed for new startups and innovative ideas, bridging the gap between academic freedom and the practical tools needed to turn ideas into viable projects. The complexity of managing such partnerships, however, can be a significant barrier, often due to past negative experiences with large consortia and the need for efficient, precompetitive collaboration.

Despite the potential benefits, the adoption of decentralized technologies in highly regulated industries like pharmaceuticals faces considerable cultural and operational challenges. Integrating these new technologies requires changing existing ways of working, which can be met with resistance within the organisation. Moreover, the effectiveness of these technologies might be hindered by regulatory requirements and the slow pace of change in established practices. Examples would include navigating the U.S. Food and Drug Administration (FDA) requirements regarding data integrity, electronic records, electronic signatures, system access, system security and controls, copies of records, audit trails, and validation within the DAO and among its participants (see FDA 21 CFR Part 11).

While some interviewees expressed familiarity with decentralized technologies and their concepts, others acknowledged their novelty and the uncertainty surrounding their implementation and funding. The concept of DAOs, for instance, is intriguing but new, raising questions about the source of funding and decision-making authority. There is hope that such initiatives can be integrated into broader strategic frameworks, involving biotech partnerships and academic collaborations to enhance the "Company's" visibility and influence in the field.

In summary, decentralized technologies hold significant promise for facilitating innovation in the pharmaceutical industry by fostering collaboration and accelerating decision-making. However, their adoption is met with challenges related to measuring success, managing complex partnerships, and overcoming cultural and regulatory barriers. Despite these hurdles, the potential for these technologies to enhance early innovation through more efficient and inclusive collaboration remains a compelling prospect for the future of drug development and research.

Theme 6: Future Trends in Pharma Innovation, Acquisition, and Licensing

The landscape of early pharmaceutical innovation, acquisition, and licensing was described by interviewees as likely to evolve significantly, driven by various emerging trends and industry dynamics. One of the most notable trends is the financial strain on biotech companies. Many biotech companies are struggling to secure funding, leading to downsizing and layoffs. The inherent difficulty of developing new technologies exacerbates these financial challenges. This situation presents both a challenge and an opportunity for large pharmaceutical companies, which will likely continue to engage in mergers, acquisitions, and BD&L activities to sustain their innovation pipelines.

The reliance on external partnerships to fuel innovation was consistently described as increasing. Currently, interviewees reported about 50% of the "Company's" pipeline is sourced through external partnerships, and this figure is anticipated to increase. This trend underscores the critical role of acquisitions and licensing in maintaining the flow of new, innovative therapies. As biotech firms face financial hurdles, larger pharmaceutical companies will increasingly step in to acquire promising technologies and integrate them into their development processes.

The workload associated with acquisitions and licensing was described by interviewees as intensifying across the industry. Pharmaceutical companies are expected to acquire biotech companies more frequently, making this strategy an integral part of their business models. This shift is not limited to the "Company" but is seen across the entire pharmaceutical sector. The proportion of revenue derived from external acquisitions is likely to increase significantly. At present, interviewees indicated that approximately 50% of revenues come from such acquisitions, but this could rise to 80% in the near future.

The growing prevalence of large company integrations, mergers, and acquisitions indicates substantial investments with the expectation of significant future revenues. These activities are becoming more common as companies seek to bolster their portfolios with innovative new products. The increasing financial and strategic reliance on acquisitions and licensing highlights the importance of these activities in the future of pharmaceutical innovation.

In summary, interviewees portrayed early pharmaceutical innovation as increasingly dependent on external partnerships, acquisition and licensing activities, with a greater financial reliance on these strategies to drive

mid- to long-term growth. As biotech companies face funding challenges, large pharmaceutical corporations—of which the "Company" can be considered a representative proxy within this study—were described as likely to continue to play a crucial role in sustaining the industry's innovation pipeline through strategic acquisitions and partnerships.

Conceptual Framework: Decentralized Approaches in Pharmaceutical External Innovation

Across the interviews, blockchain was rarely discussed as a standalone technology choice. More often, it surfaced as the underlying infrastructure that makes certain decentralized models feasible. In particular, blockchain was associated with potential mechanisms for upstream external innovation, such as auditable decision and contribution trails, programmable incentive structures, and the ability to coordinate participation across organizational boundaries. At the same time, interviewees emphasized that these blockchain-enabled features would need to operate within established governance and compliance requirements, which limits their applicability in later-stage development, integration, and commercialization activities that remain tightly controlled within incumbent firms.

Building on the empirical themes identified in this case study, and informed by the growing body of early evidence on decentralized approaches in the life sciences, we propose a conceptual framework to interpret how such approaches could complement existing models of pharmaceutical external innovation. Rather than introducing a new theory, the framework synthesises insights emerging from the interviews with broader discussions on decentralized governance, incentive alignment, and collaborative innovation in highly regulated industries.

Across the empirical material, interviewees consistently described external innovation as a multi-stage process involving the identification of external opportunities, their evaluation and prioritisation, and their subsequent development through partnerships, licensing, or acquisitions. Drawing on these observations, decentralized approaches appear particularly relevant in the early phases of this process. In the sourcing phase, decentralized and community-based mechanisms may broaden access to early scientific signals by engaging more diverse networks of researchers and innovators, potentially complementing established scouting and landscaping activities. In the selection phase, features such as distributed evaluation, transparent decision-making, and shared incentives could contribute to early sensemaking and prioritisation, especially in scientifically novel or underserved areas.

By contrast, the activation and scaling of innovation—encompassing late-stage development, regulatory execution, and commercialisation—remain closely tied to the organisational capabilities, capital intensity, and governance structures of large pharmaceutical corporations. In this respect, decentralized approaches do not emerge from our data as substitutes for traditional mergers, acquisitions, or licensing, but rather as potentially complementary mechanisms that may enhance upstream stages of external innovation while interfacing with established downstream processes.

Overall, this conceptual framing, grounded in the empirical evidence of this study, suggests that decentralized approaches may incrementally strengthen pharmaceutical external innovation by improving early-stage sourcing and selection, while large pharmaceutical organisations continue to act as central orchestrators of integration, development, and market access.

Conclusion

This research offers empirical insight into the evolving dynamics in the acquisition and funding of pharmaceutical innovation from the perspective of a top-tier, research-intensive large-cap pharmaceutical company. By highlighting the interplay between traditional methods and emerging technologies, the study contributes to the discourse among academics and practitioners by illustrating how emerging technologies are being evaluated and discussed alongside established acquisition, licensing, and partnership practices, including perceived opportunities and constraints.

The findings reveal that the "Company's" approach to acquiring external innovation is driven by a strategic vision aligned with long-term goals, prioritising investments in focused disease areas and leveraging emerging technologies. Over time, there has been a shift from internally developed solutions to embracing external innovations, indicating a proactive and comprehensive strategy. Integration of external innovations, while complex and resource-intensive, has shown to enhance the "Company's" innovative potential and broaden its therapeutic reach. Success measurement of these acquisitions relies heavily on both financial performance and strategic benefits, often assessed retrospectively.

Emerging technologies, particularly AI, big data analytics, and decentralized solutions, promise to play significant roles in facilitating early innovation through partnerships, acquisitions, and licensing. These technologies can enhance various aspects of the drug discovery and development processes and provide new avenues for collaboration and efficiency. However, challenges remain, particularly in measuring the success of decentralized approaches like DAOs, which have the potential to reshape collaboration among the industry but face cultural and regulatory barriers.

While existing work highlights the potential of blockchain and DAOs to improve coordination, trust, and

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openness in healthcare and life sciences, our case study shows that their adoption is primarily shaped by internal governance structures, regulatory constraints, and established M&A and licensing practices. Rather than examining blockchain as a standalone technological solution, this study situates decentralized technologies within incumbent firms' external innovation and acquisition frameworks. The novelty of our contribution lies in revealing how decision-makers evaluate decentralized technologies not in isolation, but relative to traditional mechanisms such as mergers, acquisitions, and partnerships. Our results indicate that, at present, blockchain-based and DAO-enabled models are perceived as complementary tools for early-stage scouting, collaboration, and ecosystem visibility, rather than as substitutes for established innovation acquisition models.

Building on these findings, this thesis proposes a conceptual interpretation of how decentralized technologies may interact with established pharmaceutical external innovation processes. Rather than positioning blockchain-based or DAO-enabled models as disruptive alternatives to existing acquisition and licensing mechanisms, the framework emerging from this study highlights their potential role in selectively strengthening early-stage activities, such as innovation scouting, knowledge aggregation, and pre-competitive collaboration. In particular, decentralized governance and incentive structures appear well suited to support exploratory phases of innovation, where uncertainty is high and traditional organisational boundaries may limit visibility and engagement. At the same time, the empirical evidence underscores that later-stage development, scale-up, and market access remain firmly anchored in the capabilities and governance structures of large pharmaceutical corporations. This conceptual framing situates decentralized approaches as complementary extensions within incumbent external innovation systems, helping to bridge early scientific exploration with established pathways for value creation.

Looking ahead, the landscape of pharmaceutical innovation, acquisition, and licensing emerges from this research as structurally shaped by persistent financial pressure on early-stage biotechnology firms and a sustained reliance on external partnerships. Financial strain on early biotech companies and the increasing reliance on external partnerships seem to be associated with higher volumes of M&A and greater capital deployment, with large pharmaceutical corporations playing a crucial role in sustaining the industry's innovation pipeline. Within this context, acquisitions, partnerships, and licensing arrangements function as core mechanisms through which innovation is scaled, risks are redistributed, and mid- to long-term competitive edge is maintained across the pharmaceutical sector.

Limitations and Further Developments

This study offers a unique opportunity to investigate the internal perspective of the "Company," a leading entity among large-cap pharmaceutical corporations. As detailed in our methodology, the "Company" is distinguished by its in-house, end-to-end drug discovery, development, and go-to-market processes across a wide range of technology platforms and disease areas. However, a notable limitation of this research is its single case study design, which captures the perspective of only one company, though relevant in the global landscape.

Another factor worth highlighting is our ability to engage seven interviewees, albeit a limited number, all of whom are of exceptionally high standing and possess expertise of primary relevance to the topic under discussion. While this approach fits our research design and questions, it inherently limits the generalisability of our findings. To address this limitation, future research should aim to include multiple large-cap pharmaceutical corporations, particularly those that have outsourced more of their drug discovery and development capabilities. This broader scope would provide a more comprehensive understanding of the industry's approach to external innovation, M&A, licensing, and partnership, and how the integration of emerging decentralized technologies could become an enabler. By comparing different models and strategies, further studies could yield insights that are more widely applicable across the pharmaceutical sector.

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Simone Fantaccini has a financial interest in the Company that served as the unit of analysis for the study, holding shares (<0.1%).

Contributors

SF: conceptualization, methodology, formal analysis, investigation, writing original draft preparation, review and editing, response to reviewers comments. LG: methodology, investigation, review and editing, supervision, response to reviewers comments. SH: conceptualization, review and editing, supervision.

All authors approve the final submission.

Data Availability Statement (DAS), Data Sharing, Reproducibility, and Data Repositories

In the preparation of this manuscript, GenAI tools were used to support language editing, text organization, and the enhancement of clarity and readability. Qualitative data analysis was conducted through thematic coding, with the support of AI-assisted qualitative analysis software.

To enhance analytical rigor and reliability, AI-enabled tools were employed for transcript preprocessing, code management, and preliminary clustering of themes. All final coding decisions, theme definitions, and interpretive judgments were made by the researchers, who retain full responsibility for the content of the manuscript.

AI tools were not used to generate original data, or autonomous scientific interpretations.

Application of AI-Generated Text or Related Technology

None

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References

1. Fantaccini S, Grassi L, Rampoldi A. The potential of DAOs for funding and collaborative development in the life sciences. Nat Biotechnol. 2024;42(4):555–62. https://doi.org/10.1038/s41587-024-02189-0
2. Liang Q, Ke Y. Evaluation of synergistic effect of continuous mergers and acquisitions in biomedical enterprises. In: 7th Int Conf Social Sci Econ Dev (ICSSED); 2022. p. 1015–19. https://doi.org/10.2991/aebmr.k.220405.170
3. DiMasi JA, Grabowski HG, Hansen RW. Innovation in the pharmaceutical industry: new estimates of R&D costs. J Health Econ. 2016;47:20–33. https://doi.org/10.1016/j.jhealeco.2016.01.012
4. Schuhmacher A, Gassmann O, Bieniok D, Hinder M, Hartl D. Open innovation: a paradigm shift in pharma R&D? Drug Discov Today. 2022;27(9):2395–405. https://doi.org/10.1016/j.drudis.2022.05.018
5. EvaluatePharma. World Preview 2020, Outlook to 2026. Evaluate Ltd.; 2020 [cited 2025 July 25]. Available from: https://fondazionecerm.it/wp-content/uploads/2020/07/EvaluatePharma-World-Preview-2020_0.pdf
6. Fisher N, Liebman S. Are M&As replacing R&D in pharma? Forbes; 2015 Apr 22. Available from: https://www.forbes.com/sites/nicolefisher/2015/04/22/are-ma-replacing-rd-in-pharma/
7. Paul SM, Mytelka DS, Dunwiddie CT, Persinger CC, Munos BH, Lindborg SR, et al. How to improve R&D productivity: the pharmaceutical industry's grand challenge. Nat Rev Drug Discov. 2010;9(3):203–14. https://doi.org/10.1038/nrd3078
8. Schwaederle M, Zhao M, Lee JJ, Eggermont AMM, Schilsky RL, Mendelsohn J, et al. Impact of precision medicine in diverse cancers: a meta-analysis of phase II clinical trials. J Clin Oncol. 2015;33(32):3817–25. https://doi.org/10.1200/JCO.2015.61.5997
9. Oberst JR. Navigating Biotech/Pharma mergers and acquisitions. Science. 2012;338(6112):1335. https://doi.org/10.1126/science.338.6112.1335
10. Giniatullina A, Boorsma M, Mulder GJ, Van Deventer S. Building for big pharma. Nat Biotechnol. 2013;31(4):284–7. https://doi.org/10.1038/nbt.2533
11. Kambham V. Mergers and acquisitions: boom in the Indian pharma industry. UPI J Bus Manag Comput Appl. 2018 [cited 2025 July 25]; 26–30. Available from: https://unique-pubinternational.com/journals/index.php/jbmca/article/view/66
12. Shepherd J. Consolidation and innovation in the pharmaceutical industry: the role of mergers and acquisitions in the current innovation ecosystem. J Health Care Law Policy. 2018 [cited 2025 July 25]; 21:1. Available from: https://digitalcommons.law.umaryland.edu/jhclp/vol21/iss1/2/
13. Salle MBdL, Thomas M. Are biotech and big pharma the perfect match? Strateg Dir. 2020;36(12):39–41. https://doi.org/10.1108/SD-04-2020-0067
14. Senior M. Pharma backs off biotech acquisitions. Nat Biotechnol. 2022;40(11):1546–50. https://doi.org/10.1038/s41587-022-01529-2
15. Guzman RA. Life sciences M&A: drivers and market outlook. GEN Edge; 2023 [cited 2025 July 25]. Available from: https://www.genengnews.com/industry-news/life-sciences-ma-drivers-and-market-outlook/
16. Baillieu J. Boom times for pharma M&A. Eur Pharm Rev. 2021;26(1):42–5.
17. Biotechnology Innovation Organization (BIO). Emerging therapeutic "Company" venture financing trends 2014–2024. BIO Industry Reports; 2024 [cited 2025 July 25]. Available from: https://www.bio.org/ia-reports/emerging-therapeutic-company-investment-and-deal-trends
18. Danzon PM, Epstein A, Nicholson S. Mergers and acquisitions in the pharmaceutical and biotech industries. Manag Decis Econ. 2007;28(4–5):307–28. https://doi.org/10.1002/mde.1348
19. Pavlou AK, Belsey MJ. BioPharma licensing and M&A trends. Nat Rev Drug Discov. 2005;4(4):273. https://doi.org/10.1038/nrd1697
20. Micklus A, Muntner S. Biopharma deal-making in 2015: changing the pharma landscape. Nat Rev Drug Discov. 2016;15(2):78–80. https://doi.org/10.1038/nrd.2016.10
21. Khetan R. Biopharma licensing and M&A trends in the 21st-century landscape. J Commer Biotechnol. 2020;25(3):38–43. https://doi.org/10.5912/jcb943
22. Kirchhoff M, Schiereck D. Determinants of M&A success in the pharmaceutical and biotechnological industry. IUP J Bus Strategy. 2011;8(1):25.
23. Behnke N, Retterath M, Sangster T, Singh A. New paths to value creation in pharma. Bain Brief. 2014. https://www.bain.com/insights/new-paths-to-value-creation-in-pharma/
24. Rafferty MA. Managing change in biotech: mergers and acquisitions. Nat Biotechnol. 2007;25(6):689. https://doi.org/10.1038/nbt0607-689
25. Grassi L, Fantaccini S. An overview of Fintech applications to solve the puzzle of health care funding: state-of-the-art in medical crowdfunding. Financ Innov. 2022;8(1):84. https://doi.org/10.1186/s40854-022-00388-9
26. Wang L, Plump A, Ringel M. Racing to define pharmaceutical R&D external innovation models. Drug Discov Today. 2015;20(3):361–70. https://doi.org/10.1016/j.drudis.2014.10.008
27. Richman B, Mitchell W, Vidal E, Schulman K. Pharmaceutical M&A activity: effects on prices, innovation, and competition. Loyola U Chicago LJ. 2016;48:787–803.
28. Jones C, Bellenger D, Johnston WJ. The influence of mergers and acquisitions on R&D managerial decision making: a multiple-case study of pharmaceutical firms. In:

Citation: Blockchain in Healthcare Today 2026, **8**: 435 - https://doi.org/10.30953/bhty.v8.435

6th Int Engaged Management Scholarship Conf; 2016. https://doi.org/10.2139/ssrn.2866957
29. Harimoto Y. Mergers, prices, and innovation: lessons from the pharmaceutical industry. SSRN [Preprint]. 2023 Nov 13 [cited 2025 July 25]. Available from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4631188
30. GlobalData. Partnerships, licensing, investments and M&A deals and trends for 2016 in pharmaceuticals. London: GlobalData; 2016 [cited 2025 July 25]. Available from: https://www.globaldata.com/store/report/partnerships-licensing-investments-and-ma-deals-and-trends-for-2016-in-pharmaceuticals/
31. Ascher J, Bansal R, Dhankhar A, Kim E. A new prescription for M&A in pharma. McKinsey & Co. 2020.
32. Grassi L, Lanfranchi D, Faes A, Renga, FM. Do we still need financial intermediation? The case of decentralized finance–DeFi. Qualitative Research in Accounting & Management. 2022;19(3):323–347.
33. Agbo CC, Mahmoud QH, Eklund JM. Blockchain technology in healthcare: a systematic review. Healthcare (Basel). 2019;7(2):56. https://doi.org/10.3390/healthcare7020056
34. Yaqoob I, Salah K, Jayaraman R, Al-Hammadi Y. Blockchain for healthcare data management: opportunities, challenges, and future recommendations. Neural Comput Appl. 2022;34(14):11475–90. https://doi.org/10.1007/s00521-020-05519-w
35. Polshettiwar S, Kachhi M, Dargude S, Jagdale S, Bhiote S, Polshettiwar D. Next frontier in pharma revolution: synergy of AI, big data, and blockchain technology. Pharma Times. 2024;56(9):21–9. ISBN: 9798369376317. https://doi.org/10.4018/979-8-3693-7630-0
36. Srinivas O, Pradhan NR. A novel NFT framework for pharmaceutical asset ownership and trading: TokenPharma. IEEE Access; 2024. https://doi.org/10.1109/ACCESS.2024.3500092
37. Sai Shibu NB, Samuel RM, Vipparla NC, Nidhin Mahesh A. Pharma-RBT: blockchain-enabled solution for PII-protected drug trails in the pharmaceutical industry. Blockchain-Enabled Solutions for the Pharmaceutical Industry; 2025: 97–122. https://doi.org/10.1002/9781394287970.ch6
38. Wason R, Arora P, Nand P, Jain V, Kukreja V. Blockchain-enabled solutions for the pharmaceutical industry. John Wiley & Sons; 2025. ISBN: 9781394287932.
39. Beck R, Müller-Bloch C, King JL. Governance in the blockchain economy: a framework and research agenda. J Assoc Inf Syst. 2018;19(10):1. https://doi.org/10.17705/1jais.00518
40. Aste T, Tasca P, Di Matteo T. Blockchain technologies: the foreseeable impact on society and industry. Computer. 2017;50(9):18–28. https://doi.org/10.1109/MC.2017.3571064
41. Hassan S, De Filippi P. Decentralized autonomous organization. Internet Policy Rev. 2021;10(2):1–10. https://doi.org/10.14763/2021.2.1556
42. Wang S, Ding W, Li J, Yuan Y, Ouyang L, Wang FY. Decentralized autonomous organizations: concept, model, and applications. IEEE Trans Comput Soc Syst. 2019;6(5):870–8. https://doi.org/10.1109/TCSS.2019.2938190
43. Savioz G, Honer K, Pesqueira A. The impact and potential of AI and DAO in life sciences R&D financing. In Navigating privacy, innovation, and patient empowerment through ethical healthcare technology (pp. 217–54). IGI Global Scientific Publishing; 2025.
44. Divyashree KS, Mishra A. Unconventional adjudication: promise of blockchain-based dispute resolution. In Applying Blockchain Technology (pp. 169–82). Auerbach Publications; 2025.
45. Cunningham J, Davies N, Devaney S, Holm S, Harding M, Neumann V, et al. The application of distributed autonomous organization governance mechanisms to civic medical data management. Iet Blockchain. 2024;4:507–25. https://doi.org/10.1049/blc2.12062
46. Neumann V, Harding M, Davies N. DAOing it as a collective: designing the future of decentralised personal health data sharing. In Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems (pp. 1–8). 2023. https://doi.org/10.1145/3544549.3585645
47. Al Jasem MS, De Clark T, Shrestha AK. Toward decentralized intelligence: a systematic literature review of blockchain-enabled AI systems. Information. 2025;16(9);765. https://doi.org/10.3390/info16090765
48. Liu W, He Y, Wang X, Duan Z, Liang W, Liu Y. BFG: privacy protection framework for internet of medical things based on blockchain and federated learning. Connect Sci. 2023;35(1):2199951. https://doi.org/10.1080/09540091.2023.2199951
49. Beltrán ETM, Pérez MQ, Sánchez PMS, Bernal SL, Bovet G, Pérez MG, et al. Decentralized federated learning: fundamentals, state of the art, frameworks, trends, and challenges. IEEE Commun Surv Tut. 2023;25(4):2983–3013. https://doi.org/10.1109/COMST.2023.3315746
50. Heyndrickx W, Mervin L, Morawietz T, Sturm N, Friedrich L, Zalewski A, et al. Melloddy: cross-pharma federated learning at unprecedented scale unlocks benefits in qsar without compromising proprietary information. J Chem Inf Model. 2023;64(7):2331–44. https://doi.org/10.1021/acs.jcim.3c00799
51. Yin RK. Case study research and applications: design and methods. 6th ed. Thousand Oaks, CA: Sage; 2018.
52. Matopoulos A, Vlachopoulou M, Manthou V, Manos B. A conceptual framework for supply chain collaboration: empirical evidence from the agri-food industry. Supply Chain Manag Int J. 2007;12(3):254–65. https://doi.org/10.1108/13598540710742568