

# INSIGHTS INTO TRENDS AND CHALLENGES OF THE PHARMACEUTICAL INDUSTRY: THE ROLE OF SCIENTIFIC BUSINESS RESEARCH

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## ABSTRACT

**Purpose:** As an important player in the healthcare sector, the pharmaceutical industry has received increased attention in the context of the coronavirus disease caused by the SARS-CoV-2 virus (COVID-19) pandemic and medicine shortages. Given the profitability of the pharmaceutical industry, there is a rising focus on business analysis from a wide range of business analysts, as well as consulting and auditing companies. However, the role of scientific research in the analysis of the pharmaceutical industry has been unclear in recent years. Therefore, this study aims to provide insight into the role of scientific business research in the development of the pharmaceutical industry.

**Methodology:** To achieve the research aim, a general review was conducted using Academy of Management journals' resources, the Web of Science platform, and the Scopus database for the selection of scientific articles. In addition, the views of leading business analysts, as well as consulting and auditing companies, on trends and challenges in the pharmaceutical industry were considered within this framework.

**Findings:** Overall, the trend over the last 15 years has been towards less fundamental research on the development of the pharmaceutical industry. It can be assumed that business analysts, as well as consulting and auditing companies, have taken over this function. However, it is probably the lack of fundamental theoretical research that is one of the determining factors for the uncertain trends and hidden challenges of an outwardly thriving industry.

**Research limitations:** This research provides an overview of trends and challenges in the pharmaceutical industry. In-depth factor analysis is beyond the limitations of this study.

**Practical implications:** This study encourages researchers to focus more on fundamental business research in the pharmaceutical industry, as empirical local market research currently dominates.

**Originality:** The study identified a research gap in fundamental business research on the pharmaceutical industry and proposes to strengthen this research to support the healthcare sector and people's health.

**Keywords:** pharmaceutical industry, trends, challenges, healthcare sector

**Paper classification:** general review

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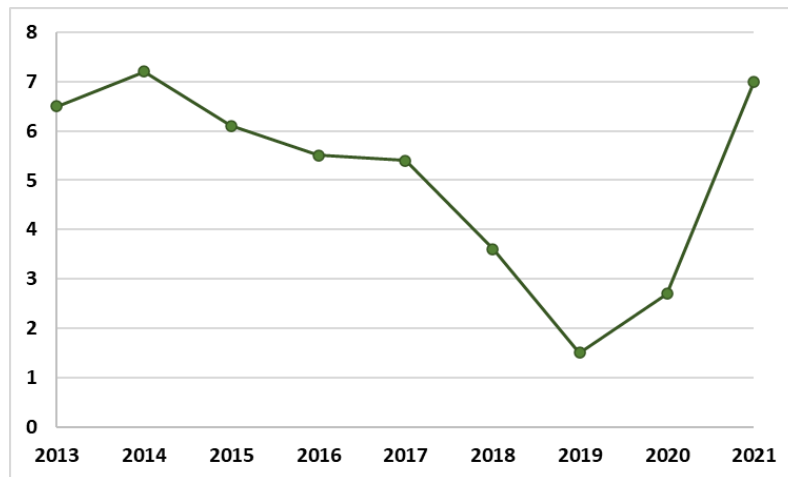
## INTRODUCTION

As an important player in the healthcare sector, the pharmaceutical industry has received increased attention in the context of the coronavirus disease caused by the SARS-CoV-2 virus (COVID-19) pandemic and medicine shortages. In order to build a coherent approach, it should be noted that, according to the Global Industry Classification Standard (GICS), the pharmaceutical industry is an industry in the healthcare sector, in the industry group “Pharmaceuticals, Biotechnology & Services” (Corporate Finance Institute, 2022a). The GICS is a 4-level classification system developed in 1999 by investment research firm Morgan Stanley Capital International (MSCI) and S&P Dow Jones Indices to categorize companies traded on public stock exchanges. The GICS is targeted at investment business professionals and correlates with the NACE Statistical Classification of Economic Activities in the European Community (Corporate Finance Institute, 2022b).

A common understanding of industry classification is essential for statistical data processing, but there is a tendency for different sources to take different approaches to the coverage of the pharmaceutical, biopharmaceutical, and life-science industries. For the purpose of this study, the use of statistics will be kept to a minimum, with reference to the industry as defined by the source. The most important indicator that can be initially noted from the statistics is that, according to IQVIA (a leading global provider of advanced analytics, technology solutions, and clinical research services to the life sciences and pharmaceutical industry), the global medicine market (using invoice price levels) is expected to grow at 3-6% CAGR through 2026 to about \$1.8Tn (IQVIA, 2022b).

Global advising and auditing organisations, consulting and business analytics companies, and financial institutions, such as PricewaterhouseCoopers (PwC), KPMG, EY, Deloitte, and McKinsey & Company, are also interested in analysis of pharmaceutical industry data. As mentioned by ClarivateTM, universities have long sought partnerships with the pharmaceutical industry to advance their research (ClarivateTM, 2023), for example, Boston University – Pharmaceuticals & Healthcare – Deals and Alliances Profile provides comprehensive data and trend analyses of companies’ mergers and acquisitions (M&As), partnerships and financings (Market Insights ReportsTM, 2017), while pharmaceutical company AstraZeneca moved its global headquarters to Cambridge in 2016 to build on its partnership with the University of Cambridge and with other research institutions, hospitals and businesses which make Cambridge the most successful life-sciences cluster in Europe (University of Cambridge, 2019).

This study looks at some of the insights these organisations and institutions have shared, to build a common research framework. However, this study does not aim to process all the voluminous data produced by highly competent organisations and institutions. Only some focal points will be used to draw attention to perhaps less obvious trends and challenges of the pharmaceutical industry. For example, despite the outwardly convincing profitability of the pharmaceutical industry, global consulting and auditing company Deloitte mentioned in the report “Measuring the return from pharmaceutical innovation 2021” (Deloitte, 2022) that the average internal rate of return (IRR) on pharmaceutical innovation for a combined cohort of companies declined sharply between 2014 and 2019 (Figure 1).

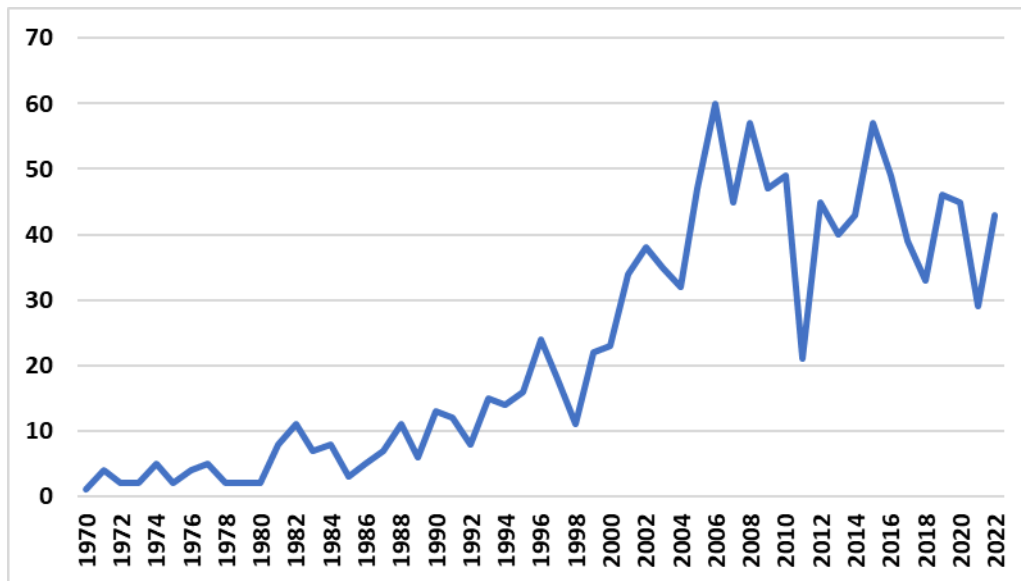


**Figure 1 Return on the late-stage pipeline of the combined cohort, 2013-2021**  
(Deloitte, 2022)

Figure 1 shows the overall trend line for the IRR between 2013 and 2021 for the combined cohort, indicating that the average IRR has returned to a value similar to that last seen in 2014. If emergency-approved COVID-19-related assets are excluded, the projected IRR is 3.2%, showing the industry has improved its core productivity (Deloitte, 2022). However, if the recovery of the IRR was driven by the COVID-19 pandemic, one wonders whether the downward trend will be reversed after the pandemic.

This is just one of the questions that led to the research question of this study: to what extent does the scientific community support the pharmaceutical industry through in-depth scientific business research? Therefore, this study aims to provide insight into the role of scientific business research in the development of the pharmaceutical industry. To achieve the research aim, a literature review was conducted to identify the volume of publications and main research directions, with a focus on exploring trends and challenges in the pharmaceutical industry.

Initially, the author believed that it would be worthwhile to look at the historical trends reflected in Academy of Management journals – one of the leading business management journal categories. Therefore, a preliminary search was carried out in Academy of Management journals to identify the historical trend of researchers' interest in conducting fundamental business research related to the pharmaceutical industry. The search items “pharmaceutical AND industry” were used for quantitative analysis of articles, without a search period start limit – and until December 2022. The results show that the first article dates from 1961, and there is a total of six articles from the 1960s. From 1970 onwards, publications were regular and the number of articles per year increased until 2006 (Figure 2).



**Figure 2** Articles in Academy of Management journals selected using the search items “pharmaceutical AND industry”, number of articles per year, 1970-2022 (Academy of Management, 2022)

Since 2006, the number of articles (per year) with a direct or indirect link to the pharmaceutical industry has been on a downward trend and shows no noticeable response to the ongoing trends and challenges in the pharmaceutical industry.

It is clear that the total number of research articles on pharmaceutical issues is increasing, as evidenced by the Web of Science (WoS) platform and the Scopus database, but it should be noted that it is dominated by empirical and narrowly specialised articles related to specific medical or business issues. The author has also contributed to research and publications on pharmaceutical enterprises’ market entry strategies (Araja and Sumilo, 2020) and the implementation of Managed Entry Agreements in Central and Eastern Europe (Ferrario et al., 2017). These studies focused on market entry and tools to improve the accessibility and affordability of medicines but also addressed specific, narrower topics.

Therefore, this study is devoted to a review of the recent scientific literature with a broader overview of trends and challenges in the pharmaceutical industry.

## RESEARCH DESIGN AND METHODOLOGY

To achieve the research aim, a review was conducted using Academy of Management journals’ resources, the WoS platform, and the Scopus database for the selection of scientific articles. The Academy of Management journals were investigated separately due to their high ranking in the ABS system and limited availability on the WoS platform and the Scopus database for the research period. In addition, the views of leading business analysts, as well as consulting and auditing companies, on trends and challenges in the pharmaceutical industry were considered within this framework.

The study design was based on two stages:

1. Firstly, articles were selected by the search items “pharmaceutical AND industry AND development AND trend\*” in titles, abstracts and keywords, for a period of five years from January 2018 to December 2022.
2. Secondly, a search was performed using the keywords “business AND analysis AND pharmaceutical AND industry AND challenge\*” in titles, abstracts and keywords, for the period from January 2020 to December 2022.

Content analysis was used to identify the main directions of research.

Accordingly, the section “Results and discussion” is divided into two subsections:

- an overview of the latest research articles analyzing development trends in the pharmaceutical industry
- an overview of the latest research articles analyzing pharmaceutical industry challenges

Each subsection starts with insights into the views of consultancies, business analysts, and auditing institutions from the relevant perspective. Statistical information is used sparingly, reinforcing the context, but without distracting from the main purpose of the study.

## **RESULTS AND DISCUSSION**

### **Overview of the latest research articles analyzing development trends in the pharmaceutical industry**

As regards the directions of development trends, a number of companies express their views, and here are some insights shared by IQVIA and Deloitte.

IQVIA emphasizes the crucial role of emerging biopharma (EBP) companies in the future development of the pharmaceutical industry. EBP companies are at the heart of early-stage drug development, and their performance, the environment in which they operate and their relationships with other stakeholders in the healthcare system are critical in determining the future of many new therapies and healthcare technologies. EBP companies sponsored 59% of the trials started in 2021, up from 29% a decade ago, while large pharma companies’ in-house trials showed the inverse pattern, dropping from 59% in 2011 to 28% in 2021 (IQVIA, 2022a).

Deloitte’s report on the return from pharmaceutical innovations demonstrates that companies are continuing to increase the proportion of external sources of innovation. The combined cohort of 15 pharmaceutical companies continues to rely on external sources, increasing them from 33% in 2017 to 71% in 2021. The cohort also revealed a significant increase in the number of co-developed assets, rising from 32% in 2020 to 46% in 2021. At the same time, Deloitte’s report points out that in 2020 and 2021, compared to 2019, the cost of developing new medicines was reduced and peak sales increased (Deloitte, 2022).

Another important trend in the drug development process is a significant shortening in clinical trial time. According to Deloitte’s report, COVID-19 phase III clinical trials were 3.7 times faster than non-COVID infectious disease trials (Deloitte, 2022). This innovation speeds up the launch of medicine to market and increases the IRR of pharmaceutical companies. The report emphasises that

success will depend on the industry's ability to learn lessons from the use of transformative trial design and rollout, cross-industry collaborations, and the adoption of digital solutions, to maintain and institutionalize new ways of working for the future (Deloitte, 2022).

In turn, the scientific literature search provided the following results for the period from 2018 to 2022:

- Academy of Management journals reported 60 articles, of which 52 were research articles, 7 were abstracts, and 1 was an editorial. The 52 research articles were used for further selection.
- The Scopus database, in the section "Business, Management and Accounting", showed 26 articles, of which 14 were research articles, 6 were book chapters, 2 were books, 2 were reviews, and 2 were conference abstracts. The 14 research articles and 2 reviews were used for further investigation.
- On the WoS platform, 48 articles were selected in the categories "Management", "Business" and "Economics", of which 34 research articles and 5 review articles were used for further selection.

Articles whose full-text review indicated a mismatch with the search objective and articles describing specific local pharmaceutical markets were excluded from further analysis. The authors of the selected articles highlighted the following development trends in the pharmaceutical industry:

1. Whereas research in organizational science journals tends to emphasize broad generalizability and organizing processes, research in healthcare journals tends to emphasize contextualized problems and the role of organizational structures and practices in solving them. Broader coordination that integrates both of these disciplinary orientations is needed. (Mayo et al., 2021)
2. Biopharmaceutical R&D productivity has been declining steadily for several decades, but evidence suggests that this trend is stabilizing or reversing due to shifting the early-stage R&D activity from large multinational pharma companies to smaller venture-backed start-up companies. (Murphey, 2020)
3. A positive correlation was found between the number of successfully approved clinical trials (CTs) and interdisciplinary collaborations. Large pharmaceutical companies are more likely to collaborate with a wider range of actors from other specialties, especially smaller industry actors who are newcomers to clinical research, resulting in exclusive access to smaller actors. (Lin et al., 2021)
4. There is a strategy of transferring external innovation focus in advance for R&D excellence, and policymakers are encouraged to provide further platforms for enhancing the external innovation ecosystem in the pharmaceutical industry. (Huang, 2021)
5. Inventor mobility is positively associated with the likelihood of alliance formation in periods following inventor movements. (Wagner and Goossen, 2018)
6. The new EU member states display a higher  $\beta$ -convergence rate than the EU15, and they have a lower capital intensity. Therefore, there is the potential risk of some of the new EU member states becoming laggards in terms of the underlying factors behind gross value added as investment and labour force. (Şerban et al., 2022)

7. International multisectoral partnerships (IMSPs) are inter-organizational structures showing great governance complexity, strong centralized control, strict boundaries, and formalization of roles and rules. (Ciabusch et al., 2020)
8. Corporate social responsibility (CSR) has an effect on the business efficiency of pharmaceutical multinational enterprises (PMNEs). (Kao and Le, 2022)
9. Pharmaceutical demand growth can explain a large portion of R&D growth. Returns to scale have been stable, whereas total factor productivity has declined significantly. Predicted rents based on the estimates and Ricardo's theory closely match the trends observed. (Myers and Pauly, 2019)
10. Two main effects shape firm value changes: a 'probability effect', which depends on how investors perceive the product's likelihood of success, and a 'portfolio effect', which depends on the relative importance of a product within a company's portfolio. (Niederreiter and Riccabon, 2022)
11. Four trends are highlighted in using technology to enhance patient-focused drug development (PFDD): (1) capturing qualitative data from patients; (2) using digital health technology tools; (3) employing reactive technology-enabled clinical outcome assessments; and (4) generating passive patient experience data. (Reaney et al., 2021)
12. In digital markets, technology processes central to exchange end up controlling many moral aspects of exchange. (Gray et al., 2019)
13. Pharmaceutical firms' markups and profitability are consistently higher than average nonfinancial firm profitability, with secularly increasing trends since 1980. Whereas R&D spending has also increased, the number of new drug approvals has not increased at the same pace and the productivity of R&D spending has been declining. (Işık and Orhangazi, 2022)
14. Evaluation of the impact of patent expiry on drug prices, performed by a systematic literature review, indicated that drug prices decreased significantly after patent expiry with drug price ratios ranging from 6.6 to 66% 1–5 years after patent expiry. The extent of this price reduction varied greatly between products and countries. (Vondeling et al., 2018)
15. Analysis reveals that the pharmaceutical industry is significantly more emission-intensive than the automotive industry, and further in-depth studies of the environmental performance of the pharmaceutical sector should inform policymakers, business leaders and academicians on how to help curb this unwarranted level of emissions in this important and growing industry sector. (Belkhir and Elmeligi, 2019)

Overall, the results of the literature review are in line with the views of consultancies on the different types of alliances, but it should be noted that the studies are fragmented and do not go deeper into the analysis of business models.

## **Overview of the latest research articles analyzing pharmaceutical industry challenges**

This subsection begins with some insights from McKinsey & Company, Deloitte, and PricewaterhouseCoopers (PwC).

The global management consulting company McKinsey & Company has emphasised that factors such as the COVID-19 pandemic, inflation, geopolitics, new therapeutic modalities, and new ways of working make it vital for pharmaceutical companies to carefully reconsider their long-term choices in sourcing, manufacturing, and the supply chain. The changes are likely to bring more fragmentation of technology and unique product life cycles (Dukart et al., 2022).

In the view of McKinsey & Company, the global trends have six major implications for the pharmaceutical industry: rising operational complexity, increasing risk, shifting capability requirements, higher capital expenditure requirements, variable-cost increases, and opportunities for savings. Meeting pharmaceutical industry challenges will mean recalibrating strategic responses (Dukart et al., 2022).

McKinsey & Company has suggested accelerating and scaling responses across four strategic domains: network and resilience, digital strategy, the operating model and ecosystem, and talent strategy. While these topics are likely to be familiar to any business leader, they now require a substantial shift in mindset. Acting on them also calls for a large investment of resources (Dukart et al., 2022).

In turn, Deloitte has proposed its vision on the five further forces of the pharmaceutical industry and relevant challenges for reimagining traditional business models, based on the results of a survey of pharmaceutical companies performed in 2020. The forces and relevant challenges are defined as follows (Ford et al., 2020):

- Curative therapies: Treatments that cure disease could reduce or eliminate the demand for some prescription medicines. Developing, marketing and pricing curative treatments could require the adoption of new capabilities.
- Customized treatments: Personalization in medicine – driven by data-powered insights – could effectively match patients with customized medicines or design therapies that would work for just a few people or even a particular person.
- Digital therapeutics: Effective and scalable digital interventions, often centred on behaviour modification, can reduce the need for pharmaceutical intervention and eliminate or temper the demand for medications.
- Prevention and early detection: Vaccines and improvements in wellness could help prevent disease, making treatment for some diseases no longer necessary. Advances in early detection will enable interventions that can halt diseases at the onset.
- Nonpharmacological interventions: Coupled with more accurate and precise imaging technologies, precision interventions that utilized robotics, nanotechnology, or tissue engineering could provide alternatives to pharmaceutical intervention.

Concerning mergers and acquisitions (M&A) activity and valuations in health industries, international financial consulting and accounting company PwC has emphasised that pharmaceuticals and life sciences (PLS) and healthcare services (HCS) have continued to attract high levels of investor interest. Capability-driven deals have increased in relevance for many companies, including deals that provide access to new technologies such as mRNA and gene therapy (PricewaterhouseCoopers, 2022).



Competition between large pharma companies and institutional investors – venture capital (VC), initial public offerings (IPOs), etc. – remains high, particularly for medium-sized biotech platforms. Deal volumes and values in health industries increased between 2020 and 2021 by 32% and 65%, respectively. The growth in deal values was partly attributable to an increase in the number of announced megadeals – those with a deal value greater than US\$5bn – from six in 2020 to 18 in 2021 (PricewaterhouseCoopers, 2022).

PwC indicates the key issues driving M&A activity (PricewaterhouseCoopers, 2022):

- Portfolio optimisation: Traditional big pharma players seek to optimise their portfolios by divesting over-the-counter and other less innovative platforms and continuing to target biotech companies at the frontier of science, such as cell and gene therapy or next generation therapeutics.
- Environmental, social and governance (ESG) considerations: Health industries offer increasingly attractive investment opportunities, as they meet the evolving criteria of investors, stakeholders and governmental institutions to provide a clear contribution to global societal challenges.
- Digitalisation of the patient experience: The ongoing digitalisation of PLS and HCS business models through the intersection of digital analytics technology, smart health devices, healthcare practice management software and consumer-centric delivery models (including developing direct-to-customer digital therapeutics offerings) is driving cross-sector deals, as established players modernise their business models.

PLS and HCS firms are increasingly acquiring or partnering with tech companies to leverage digital solutions – including mining and monetising large datasets of patient information – to enhance interactions and a more personalised approach to payers, providers and consumers (PricewaterhouseCoopers, 2022).

At the same time, the scientific literature search provided the following results for the period from 2020 to 2022:

- Academy of Management journals reported 77 articles, of which 67 were research articles, 9 were abstracts, and 1 was an editorial. Only research articles were used in further investigation, excluding proceedings without full text.
- In the section “Business, Management and Accounting” of the Scopus database, there were 23 articles (22 full-text research articles and 1 review article).
- Using the WoS platform, 8 articles (7 research articles and 1 review article) were selected in the categories “Management”, “Business” and “Economics”, after the exclusion of early access articles and those duplicating the Scopus results.

Articles whose full-text review indicated a mismatch with the search objective and articles describing specific local pharmaceutical markets were excluded from further analysis. The findings of selected articles emphasised the following challenges of the pharmaceutical industry:

1. Financial market scrutiny is related to a strategic choice pharmaceutical firms face: whether to develop R&D projects in house or license out their technologies. A qualitative analysis of

- analyst reports reveals that analysts not only have strong preferences for the blockbuster drug model, but also have clear reservations against the out-licensing model. (Klueter et al., 2022)
2. Firms accused of infringement have higher levels of innovation following litigation relative to other similar firms. Furthermore, litigation of patents that build on recent and heterogeneous knowledge and are characterized by greater scope more strongly enhance the accused firms' subsequent innovation. Thus, patent litigation can facilitate knowledge spillovers. (Awate and Makhija, 2022)
  3. Trade-off that may exist between the quantity and quality of innovation outcomes in divesting firms, as moderated by their organization designs, suggests that innovation benefits of divestitures should be lower for firms with decentralized rather than centralized R&D units. (Eklund and Feldman, 2020)
  4. The emergence of Contract Development & Manufacturing Organizations (CDMOs) in the biopharmaceutical industry has allowed firms to contract, as opposed to internalize, complementary assets. As CDMOs have expanded their service offerings, the number of out-licensing deals among biopharmaceutical firms has declined. (Moreira and Klueter, 2022)
  5. Extensive analysis of the literature, and the contextualization of the recent novel coronavirus epidemic as a case, offer conclusions and reflections from a management perspective on the ability of product development partnerships (PDPs) in managing the drug development process to mitigate risks related to neglected and emerging infectious diseases. (Pereira et al., 2020)
  6. Each pharmaceutical company is in a different financial outsourcing position, but from case studies, the main reasons for implementing outsourcing are the same for many companies, with cost reduction being the main reason – this is despite it having been confirmed that there are hidden costs involved in the implementation process. (García et al., 2022)
  7. Creating and developing innovative business models (BM) is currently becoming one of the key success factors for contemporary business. The framework for BM innovation defines BM elements, BM innovation aspects, and BM innovation logic. Technological innovations can be activated using managerial tools and insights and also can be combined into a holistic system based on the needs of the key value chain actors. (Klimanov et al., 2021)
  8. The effects of firm-level diversification on business and innovation performances in pharmaceutical firms consider the following issues: (1) three diversification types: market, product, and technology; (2) clear separation between market and product diversification; and (3) two diversification perspectives: balance-centred and hetero-centred. In the case of market diversification, less market heterogeneity causes significant influence on business performance. For products and technology, a concentrated and greater heterogeneity of product diversification promotes business performance, while the more intensive and heterogeneous technology diversification has been shown to improve innovation performance. (Kim et al., 2021)
  9. The impact of exploitative and explorative quality management (QM) practices on firm performance is contingent on the competitive strategy pursued. Explorative QM practices are significantly more relevant for firms following a differentiation strategy, whereas exploitative QM practices are significantly more relevant for cost leaders. Furthermore, for strategically

- ambidextrous firms, the interplay of the two QM practices matters. (Castillo-Apratriz et al., 2020)
10. The symmetric sharing of information between pharmacists and employees of pharmaceutical companies has a positive effect on perceived quality. Moreover, quality information has a positive impact on logistics performance, whereas informational justice does not. (Lee et al., 2020)
  11. Gamification is usually related to employee motivation, which is conducive to the achievement of better results in an organization. Moreover, gamification techniques can be used in each phase of the development process of periodical product quality reviews (PQRs). (Marcão et al., 2021)
  12. Artificial intelligence (AI) supports the business processes of pharmaceutical companies. Small pharma companies significantly change R&D, master data management, analysis and reporting, and human resources (HR) business processes under the influence of AI. Large pharma companies use AI to transform production, sales, marketing, and analysis business processes. In turn, medium-sized companies are in the middle and individually transform their business processes depending on their specialisation. (Kulkov, 2021)
  13. Sustainability of the pharmaceutical industry remains unexplored and might represent opportunities for future research, including waste management, the economic impact of new drugs, the contribution of pharmaceutical companies to the economic sustainability of health systems, and the study of emerging vs. mature markets. (Milanesi et al., 2020)

Business analysts suggest that the COVID-19 pandemic gave a push to R&D in the pharmaceutical industry, but there is no certainty that this trend will continue in the post-pandemic period. There is currently a search for new business models, which is largely linked to M&A activities, as well as to divesting and the role of SMEs in the R&D process.

In the context of the challenges, there are signs that the strategies developed by the companies themselves are creating uncertainty and concern about the future profitability of the business. For example, it is mentioned that precision medicine and cure technologies may reduce the demand for medicines in the future.

In turn, the scientific literature is mainly empirical, focused on the results of local pharmaceutical market research. Consequently, the selection of publications for this study, with the aim of finding the most fundamentally oriented results from the analysis of the pharmaceutical business, resulted in a rather narrow range. The most fundamental studies are devoted to the formation of various alliances and to assets management, R&D organisation and financing. In addition, digitisation, QM, sustainability, and gamification are addressed.

This research provides an overview of trends and challenges in the pharmaceutical industry, and in-depth factor analysis is beyond the scope of this study.

## **CONCLUSIONS AND RECOMMENDATIONS**

1. The pharmaceutical industry is receiving increased attention from various business analysts, as well as audit and consulting companies. The decline in the number of scientific articles on the

pharmaceutical industry in recent years may indicate that the services offered by business consultancies are replacing scientific research.

2. Business analysts' forecasts suggest that the pharmaceutical business will continue to thrive, despite some inconsistencies. The most notable of them, noted by business analysts and researchers, relates to the decline in R&D efficiency observed between 2014 and 2019. The COVID-19 pandemic period revitalised R&D in the pharmaceutical industry and the following years saw increased R&D activity. However, there is no certainty that R&D efficiency will be maintained in the post-pandemic environment.
3. At the same time, research publications show that the profitability of the pharmaceutical industry is not clearly reflected in innovations. A significant trend that is being highlighted by business analysts is that the proportion of external sources of innovation in the pharmaceutical industry increased rapidly and reached 71% in 2021. It may imply a crisis of capacity in big pharma R&D. This problem is likely to be addressed through various alliances, as both business analysts and researchers point out.
4. Business analysts and researchers note that success will depend on the industry's ability to learn lessons from previous experience, and on the adoption of digital solutions, to maintain and institutionalize new ways of working for the future.
5. Scientific publications also focus on aspects such as environmental protection and sustainability, given the pharmaceutical industry's critical impact on the environment, social responsibility, assessment of patient outcomes, pricing of medicines and affordability for patients.
6. The theoretical research additionally highlights the potential synergy of organisational science and healthcare, defined broadly as research focusing on topics commonly studied in the organisational and management literature and conducted in healthcare settings. These aspects require an integrative approach and future research.
7. The trend over the last 15 years has been towards less fundamental research on the development of the pharmaceutical industry. Scientific business research in the pharmaceutical industry is likely to continue to be predominantly empirical research. However, the move away from fundamental research in the pharmaceutical industry has led to uncertain trends and hidden challenges in an outwardly thriving business.
8. Accordingly, it would be advisable to pay more attention to the fundamental business research of trends and challenges in the pharmaceutical industry. This is important given that the pharmaceutical industry is one of the leading industries in the healthcare sector with a major impact on treatment outcomes and people's health.

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