

Review

# Corporate university in two registers: human capital strategy and critique of the academy- a systematic literature review (2010–2026)

Frans Hendra Suryanta Sembiring<sup>1</sup>, Janah Sojanah<sup>1,\*</sup>, Juliana Juliana<sup>1,\*</sup>, Alfira Sofia<sup>1</sup>, Asep Miftahuddin<sup>1</sup>, Rieka Mustika<sup>1</sup>, Herman Herman<sup>1</sup>, Rizqiana Arifatul Husna<sup>2</sup>

<sup>1</sup> Universitas Pendidikan Indonesia, Bandung, Indonesia

<sup>2</sup> Management Program RUDN University, Rusia

\*Corresponding author: Janah Sojanah, [janahsojanah@upi.edu](mailto:janahsojanah@upi.edu); Juliana Juliana, [julian@upi.edu](mailto:julian@upi.edu)

## CITATION

Sembiring F, Juliana J, Sofia A, et. al. Corporate university in two registers: human capital strategy and critique of the academy- a systematic literature review (2010–2026). *Human Resources Management and Services*. 2026; 8(4): 6037.  
<https://doi.org/10.54517/hrms6037>

## COPYRIGHT



Copyright © 2026 by author(s).  
*Human Resources Management and Services* is published by Piscomed Publishing Pte. Ltd. This work is licensed under the Creative Commons Attribution (CC BY) license.  
<https://creativecommons.org/licenses/by/4.0/>

**Abstract:** Corporate universities have become a recurrent reference point in debates about how organizations build human capital, yet the term carries two largely disconnected meanings: a firm-operated learning-and-development (L&D) institution and a critical shorthand for the corporatized, managerialist transformation of higher education. This ambiguity fragments the evidence base on which human resource management (HRM) and human resource development (HRD) scholars rely. This review asks how scholarly output on corporate universities evolved from 2010 to 2026, what conceptual meanings coexist in the literature, and what themes, theories, and methods characterize each. Following the PRISMA 2020 guidelines, a single Scopus search (June 8, 2026) identified 69 journal articles, of which 59 met the eligibility criteria and were synthesized. Bibliometric mapping in Biblioshiny and VOSviewer complemented the thematic synthesis. The corpus grew at an average annual rate of 9.05%, was highly dispersed across 62 sources with no dominant outlet, and was citationally skewed (mean, 13.3; median, 4 citations). Two strands emerged: Strand A frames the corporate university as an instrument of strategic human capital development (n = 22), whereas Strand B treats it as an object of critique within higher education (n = 37). These two strands rarely cite each other and rest on different theoretical foundations. By naming and mapping this conceptual split, the review clarifies which evidence is usable for HRM/HRD theory building and argues that the L&D strand, though smaller and less cited, is where the field's most actionable contributions are concentrated.

**Keywords:** corporate learning; corporate academy; learning organization; talent development; bibliometric analysis; PRISMA

## 1. Introduction

Few assets are as consequential for organizational performance as the knowledge, skills, and adaptive capacity of a workforce, and few questions occupy human resource management (HRM) more persistently than how to develop these capacities at scale. As product cycles shorten and skills depreciate faster, firms have increasingly internalized the learning function, establishing dedicated structures frequently branded as “corporate universities” or “corporate academies” to align employee development with their strategy (Rohmana et al., 2026). The appeal is intuitive: a permanent, governed, strategy-linked learning architecture promises to convert training expenditures into durable human capital rather than ad hoc course consumption. Recent work in this journal reflects the same conviction, framing competency-based training and workforce planning as levers that connect human resource development (HRD) directly to business performance (Altuntaş et al., 2026; Noor et al., 2026; Kamarul Zaman et al., 2025) and treat digitally enabled training

and development as a core component of HR strategy in distributed and remote settings (Yang & Zhang, 2025; Moh et al., 2026). A related contribution in this journal extends the same human-capital lens to cross-cultural settings, examining the competencies of technical proficiency, creative problem-solving, technological adaptability, and cultural intelligence that practitioners need to develop inclusive, future-ready capabilities for global markets (Roadkasamsri et al., 2025).

However, the phrase “corporate university” is conceptually ambiguous. In one usage, it denotes an in-house L&D institution operated by a firm to cultivate capabilities, transmit culture, and support a learning organization. Second, it functions as a critical label for the corporatization of higher education, the migration of managerialist logic, audit culture, and market rationalities into public universities in Portugal. These two senses are not merely different applications of a shared idea; they belong to different literatures, mobilize different theories, and pursue different normative aims than the other. The former asks how to make corporate learning work, while the latter asks what is lost when the academy operates as a corporation. A reader encountering the term in a database search will retrieve both intermixed, with no signposting of the conversation that a given article joins.

This conceptual doubling is important for HRM and HRD. Systematic reviews are only as useful as the coherence of the corpus they summarize, and an HRD scholar searching for evidence on how corporate universities build human capital will find that the conversation is diluted by a larger body of critical higher education scholarship that, despite sharing keywords, offers little operational guidance for workforce development (Iskandar et al., 2026). The problem is not that critique is unimportant; it is that the two strands have not been disentangled, so the field cannot easily see how much usable L&D evidence exists, how it is distributed, or where it is thin. Adjacent reviews in this journal show both the value and difficulty of synthesizing fragmented education and development literature, whether on succession planning across higher education institutions (Hoque & Zheng, 2024) or university student entrepreneurship read through an HRD lens (Lee et al., 2022), and they motivate a similarly disciplined mappine.

To our knowledge, no systematic review has explicitly mapped these two meanings of corporate universities within a single reproducible search and adjudicated their relevance to HRM/HRD. Prior treatments tend to sit wholly inside one strand, either describing corporate-university design and outcomes or critiquing the neoliberal academy without acknowledging that they share a search space. This review addresses this gap by combining bibliometric descriptions with thematic synthesis to make the split visible and analyzable. We were guided by the following three research questions.

**RQ1.** How has scholarly output on the corporate university/academy evolved from 2010 to 2026 in terms of volume, sources, geography and citation impact?

**RQ2.** What distinct conceptual meanings of “corporate university” are present in the literature, and how is the corpus distributed across them?

**RQ3.** What themes, theoretical lenses, and methodological approaches characterize each meaning, and where do the gaps lie?

This study makes three main contributions. First, we provide a bibliometric portrait of a dispersed and citation-skewed field. Second, we named and quantified a conceptual bifurcation that has remained implicit, distinguishing the corporate university as an HRD instrument (Strand A) from it as a critique of the academy (Strand B). Third, we clarify which body of evidence is genuinely actionable for

HRM/HRD and argue that the smaller, less-cited L&D strand is where the field's most practically relevant and most underdeveloped contributions are concentrated. The remainder of this article describes the review protocol, presents bibliometric and thematic results, discusses implications for human capital development, and sets out directions for future research.

## 2. Materials and methods

### 2.1. Review design and protocol

This study was a systematic literature review (SLR) reported in accordance with the PRISMA 2020 guidelines (Page et al., 2021; Damayanti et al., 2026). The review was guided by the three research questions stated above: the evolution of scholarly output (RQ1); the distinct conceptual meanings of “corporate university” and the distribution of the corpus across them (RQ2); and the themes, theoretical lenses, and methodological approaches that characterize each meaning, together with the gaps (RQ3). A protocol specifying the search string, eligibility criteria, and analysis plan was developed prior to screening.

### 2.2. Data source and search strategy

The Scopus database was searched on June 8, 2026. The query targeted the title, abstract, and keyword fields using two truncated term groups with filters applied directly to Scopus (**Table 1**). The unrestricted query returned 630 records; restricting the publication year to the 2010–2026 window reduced this to 397 records, and applying the source type (journal), open access, publication stage (final), document type (article), and language (English) filters yielded a final set of 69 records. The complete identification, screening, and inclusion processes are shown in **Figure 1**.

**Table 1.** Search string and Scopus filters

| Parameter         | Setting                                       |
|-------------------|-----------------------------------------------|
| Field             | TITLE-ABS-KEY                                 |
| Query             | “corporate universit*” OR “corporate academ*” |
| Document type     | Article (ar)                                  |
| Language          | English                                       |
| Open Access       | All OA types                                  |
| Source type       | Journal (j)                                   |
| Publication stage | Final                                         |
| Publication year  | 2010–2026                                     |

### 2.3. Eligibility criteria

Records were included if they were peer-reviewed journal articles, in English, openly accessible, at the final publication stage, published in 2010–2026, and substantively concerned with the corporate university/corporate academy in either of two senses: (i) an in-house learning-and-development (L&D) institution operated by firms or (ii) a critical shorthand for the corporatized, managerialist, and neoliberal transformation of higher education. Records were excluded where the search terms appeared only incidentally (for example, “corporate” and “academic” as unrelated descriptors) or where the article addressed an unrelated domain without engaging the

construct itself.

## 2.4. Study selection

After applying all filters, 69 records remained, all of which satisfied the technical criteria because a single database was used and no duplicate removal was required. All 69 records underwent title and abstract screenings. Ten records were excluded as off-topic false positives, and the remaining 59 were retained for the synthesis. Each retained record was classified into one of two conceptual strands: Strand A, corporate university as an organizational L&D institution ( $n = 22$ ), and Strand B, corporate university as a critique of the corporatized academy ( $n = 37$ ). The selection process is illustrated in **Figure 1**.

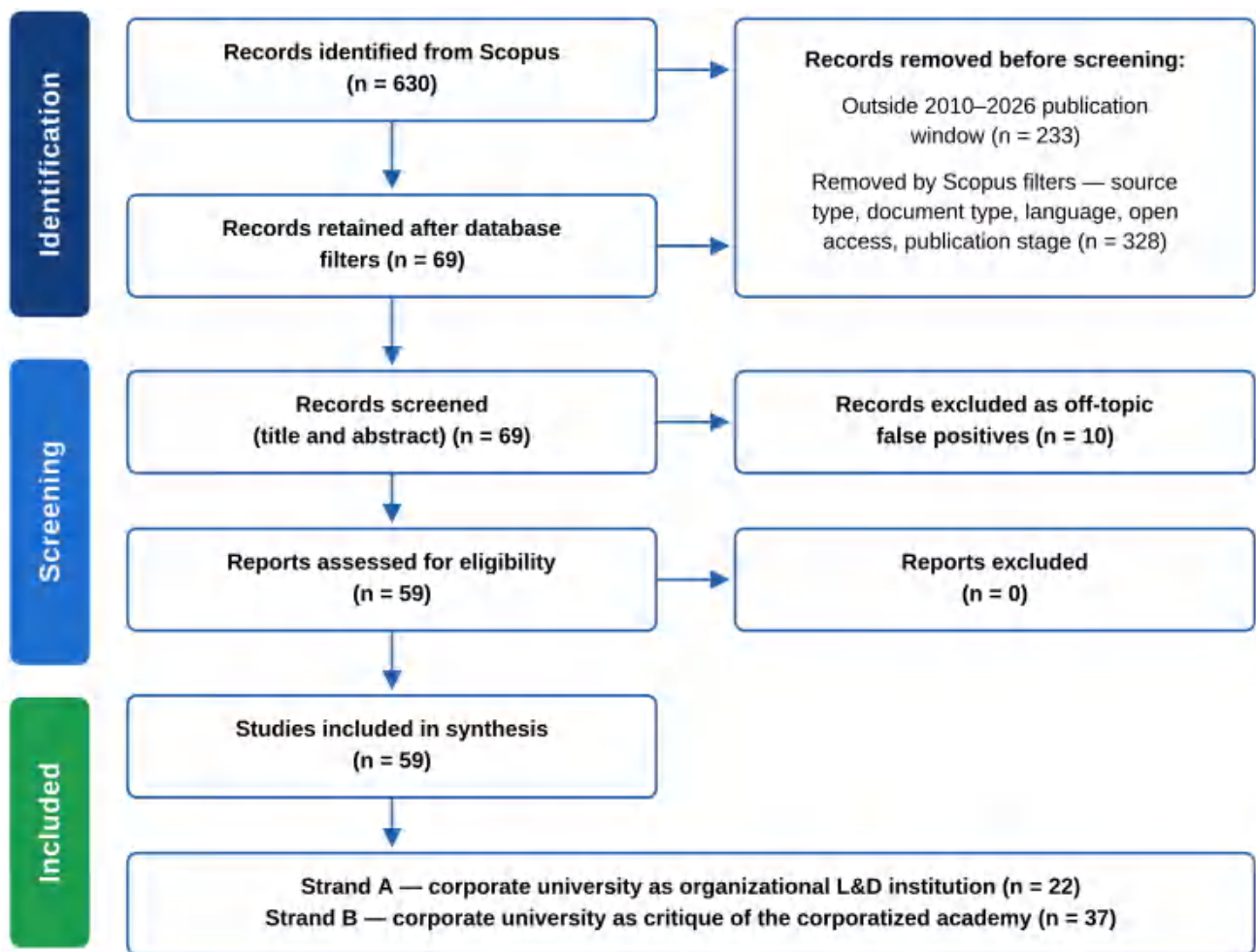


**Figure 1.** PRISMA 2020 flow diagram of the study selection process

## 2.5. Data extraction and analysis

For each included article, the following fields were extracted: authors, year, title, source title, author affiliations and country, citation count, author and index keywords, abstract, methodological approach, and assigned conceptual strands (see Appendix A). The analysis was conducted in two stages. First, a descriptive bibliometric analysis of publication trends, leading sources, geographic distribution, and citation impact was conducted to address RQ1, as follows. Bibliometric indicators and science maps were produced in the Bibliometrix/Biblioshiny environment (Aria & Cuccurullo, 2017), and term co-occurrence networks were visualized using VOSviewer (Van Eck & Waltman, 2010). Second, thematic synthesis within and across the two strands

surfaced recurring themes, theoretical frameworks, and methodological patterns to address RQ2 and RQ3. The descriptive statistics in Sections 3.1–3.4 cover the full identified corpus ( $n = 69$ ), whereas the thematic synthesis in Section 3.5 draws on the 59 articles that passed eligibility criteria. Methodological limitations, such as reliance on a single database, English-only and open-access-only coverage, and the inclusion of only final-stage articles, are discussed.

### 3. Results

#### 3.1. Publication trend

The corpus spans 2010–2026 and comprises 69 documents drawn from 62 sources, with an average annual growth rate of 9.05% and an average document age of 6.12 years. The output was negligible at the start of the window, increased unevenly throughout the 2010s, and reached a single-year maximum of 11 articles by 2024 (Table 2; Figure 2). Two features stand out. First, the series is volatile rather than smoothly cumulative; local peaks in 2017 (7) and 2021 (8) are each followed by sharp contractions, and the 2024 spike is preceded by a 2023 trough of only two articles. Such volatility is consistent with a topic sustained by sporadic special issues and event-driven attention rather than a stable and self-reinforcing research program. Second, the post-2020 acceleration coincided with the pandemic period when both the operational case of corporate learning and the critical scrutiny of universities intensified. The appearance of pandemic-era keywords in the term maps (Section 3.5) reinforces this interpretation. The cumulative trajectory remains in an early growth phase, indicating a field that is expanding but has not yet matured into settled, high-consensus literature.

**Table 2.** Annual distribution of publications (2010–2026).

| Year         | Articles  |
|--------------|-----------|
| 2010         | 1         |
| 2013         | 4         |
| 2014         | 2         |
| 2015         | 3         |
| 2016         | 5         |
| 2017         | 7         |
| 2018         | 6         |
| 2019         | 5         |
| 2020         | 2         |
| 2021         | 8         |
| 2022         | 4         |
| 2023         | 2         |
| 2024         | 11        |
| 2025         | 5         |
| 2026         | 4         |
| <b>Total</b> | <b>69</b> |

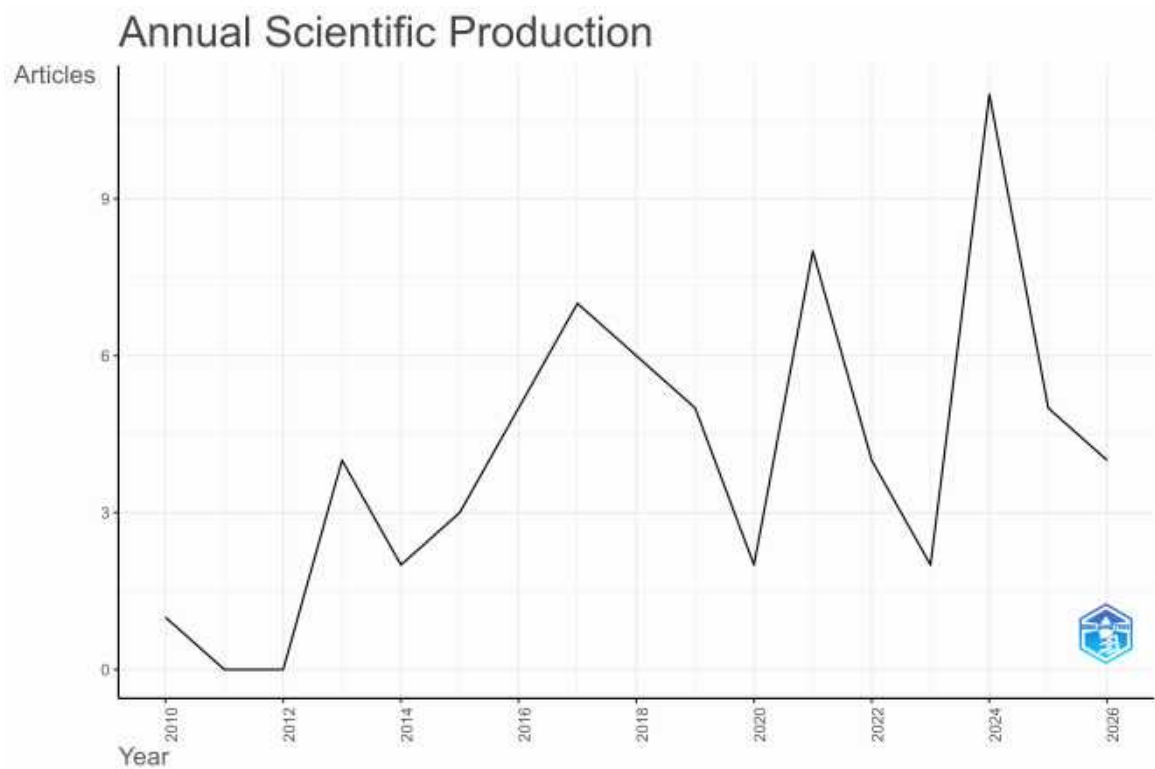


**Figure 2.** Annual scientific production, 2010–2026 (Biblioshiny)

### 3.2. Leading sources

The literature was strikingly dispersed; 69 articles were distributed across 62 distinct sources, and only six outlets contributed to two or more articles (**Table 3**). The most prolific single source, *Radical Teacher*, with three articles, is a venue of critical pedagogy rather than HRM, an early signal that the corpus is anchored as much in critical higher education conversation (Strand B) as in management literature. The remaining repeat sources were split between management and learning outlets (*The Learning Organization*, *Management Learning*, *Management Science Letters*) and broad multidisciplinary venues (*SAGE Open* and *Library Trends*). The near-absence of source concentration means that the field lacks a recognizable “home” journal and, by extension, the editorial gatekeeping and cumulative dialogue that a core outlet provides. For HRM/HRD readers, this fragmentation is precisely why a synthesizing review is valuable: evidence is scattered across communities that do not routinely read each other.

**Table 3.** Source titles contributing two or more articles

| Source title                      | Articles |
|-----------------------------------|----------|
| <i>Radical Teacher</i>            | 3        |
| <i>Library Trends</i>             | 2        |
| <i>Management Science Letters</i> | 2        |
| <i>The Learning Organization</i>  | 2        |
| <i>Management Learning</i>        | 2        |
| <i>SAGE Open</i>                  | 2        |

### 3.3. Geographic distribution

Authorship is dominated by Anglophones and European contexts. The United States (11) and the United Kingdom (8) lead, followed by Canada and the Russian Federation (5 each), Spain and Indonesia (4 each), and New Zealand, Australia, Sweden, and Denmark each contributing three (**Table 4**). International co-authorship is moderate at 26.09%, and most output is single-authored or in small teams (2.94 co-authors per document), which is more typical of the essayistic, humanities-inflected critical strand than of large empirical management collaborations. The presence of Indonesia among the leading contributors is notable for an emerging economy and HRD-active context and aligns the corpus with this journal's regional readership. It also signals that the corporate-university construct travels well beyond its Anglo-American origins, raising questions in the Discussion section about how the model is adapted to firms outside high-income settings.

**Table 4.** Ten most frequent contributing countries (by author affiliation)

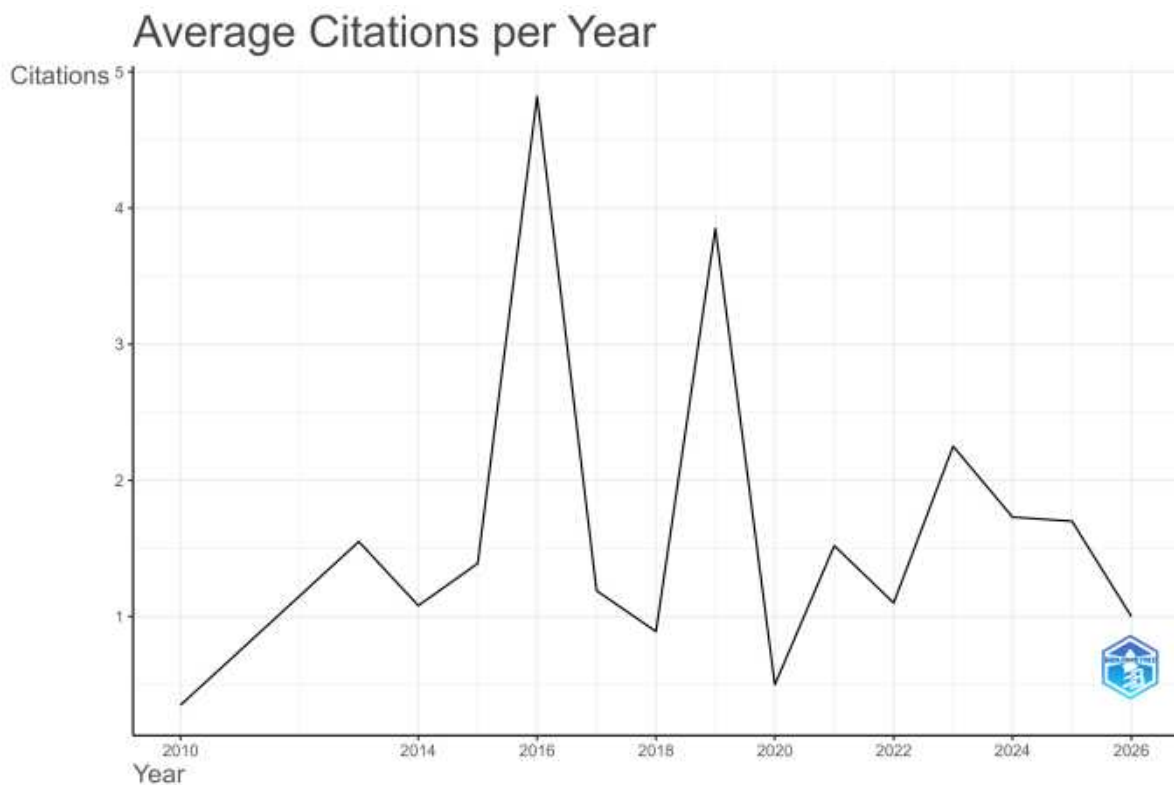
| Country            | Articles |
|--------------------|----------|
| United States      | 11       |
| United Kingdom     | 8        |
| Canada             | 5        |
| Russian Federation | 5        |
| Spain              | 4        |
| Indonesia          | 4        |
| New Zealand        | 3        |
| Australia          | 3        |
| Sweden             | 3        |
| Denmark            | 3        |

### 3.4. Citation impact

Across the identified corpus ( $n = 69$ ), the total citation count was 919, with a mean of 13.3 and a median of 4 citations per article; the most-cited article had 153 citations, and seven articles had no citations. The gap between the mean and median confirms a heavily right-skewed distribution, in which a handful of works carry most of the visibility (**Table 5**; **Figure 3**). Critically, for this review, the upper tail leans toward Strand B: the two most-cited works on citizen-science rhetoric in research initiatives (Woolley et al., 2016) and on academic boards and academic capital in university governance (Rowlands, 2013), and several others in the top ten engage the corporatized academy rather than the firm-based L&D. A clear exception is the study of corporate universities as vehicles for the co-creation of social innovation (Chin et al., 2019), the highest-cited Strand A work. This pattern indicates that scholarly attention, as measured by citation, has accrued disproportionately to the critique-of-the-academy conversation, even though the L&D conversation is arguably more actionable for practicing a divergence between visibility and applied relevance that we return to below.

**Table 5.** Ten most-cited articles in the corpus

| #  | Short title (first author, year)                                      | Source                                    | Cited by |
|----|-----------------------------------------------------------------------|-------------------------------------------|----------|
| 1  | Citizen science or scientific citizenship (2016)                      | BMC Medical Ethics                        | 153      |
| 2  | Academic boards: less intellectual, more academic capital (2013)      | Studies in Higher Education               | 71       |
| 3  | “Playing mother”: channeled careers and gender in academia (2019)     | <i>SAGE Open</i>                          | 69       |
| 4  | Affective labor, resistance, and the academic librarian (2016)        | <i>Library Trends</i>                     | 49       |
| 5  | The emotional knots of academicity (2016)                             | Higher Education Research & Development   | 42       |
| 6  | Responsibilisation and leadership in the neoliberal university (2017) | Discourse                                 | 42       |
| 7  | Co-creation of social innovation: corporate universities (2019)       | Sustainability                            | 40       |
| 8  | Wake up or perish: neo-liberalism and the public university (2015)    | Cultural Studies – Critical Methodologies | 39       |
| 9  | Subjective outcome evaluation of service-learning (2021)              | Child Indicators Research                 | 36       |
| 10 | Moving towards digital governance of university scholars (2019)       | Journal of Management and Governance      | 31       |

**Figure 3.** Average citations per article by year of publication (Biblioshiny).

### 3.5. Thematic mapping: two conceptions of the corporate university

The descriptive picture sets up the review's central finding, which the term-level evidence makes visible. The word cloud of the corpus (**Figure 4**) is organized around two large, weakly connected centers of gravity: “corporate university/universities” on one side and “higher education” on the other, surrounded by satellite



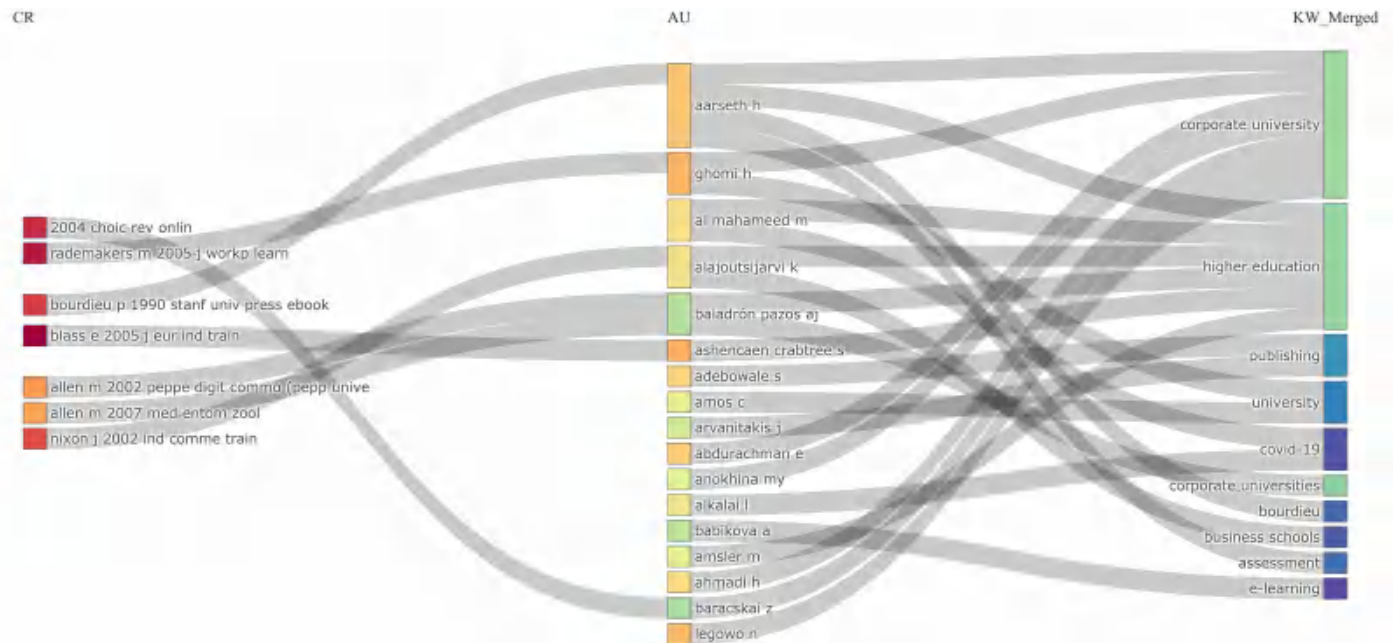


**Figure 6.** Three-field plot linking cited references (left), authors (center), and merged keywords (right) (Biblioshiny).

### 3.5.1. Strand A corporate university as an organizational L&D institution (n = 22)

Strand A treats a corporate university as a deliberately designed organizational structure for human capital development. Definitionally, articles in this strand converge on the corporate university as a firm-governed, strategy-aligned learning institution distinct from a training department in that it is permanent, branded, and accountable for capability outcomes rather than course delivery. The recurring themes are practical and managerial: the design and governance of the corporate university as a stakeholder system (Patrucco et al., 2017); the evaluation of its performance and contribution (Cappiello & Pedrini, 2017); its role as a knowledge-management and lifelong-learning engine, including non-Western firms (Han et al., 2024; Ghomi & Barzinpour, 2018); and its strategic positioning as a driver of ambidexterity and competitiveness, including in telecommunications and emerging economies (Lissillour & Rodriguez-Escobar, 2023; Shakina et al., 2024; Mora-Mora et al., 2025). A distinct empirical subtheme links leadership and outcomes, exemplified by evidence that CEO education through corporate universities relates to firm performance (Nguyen & Fan, 2022), while the most recent entries push toward digital and AI-enabled delivery (Saychenko, 2026), and work-based learning bridges between firms and higher education (Kristiawan et al., 2025).

Theoretically, Strand A draws on the learning-organization tradition, resource-based and human-capital views of the firm, and knowledge-management framework lenses, in which learning structures are investments expected to yield capability and performance returns. Methodologically, it is the more empirical of the two strands, favoring case studies, surveys, and increasingly structured decision and modeling approaches, although the sample sizes are typically small and cross-sectional in nature. The principal gap is evidential rather than conceptual: despite a coherent vocabulary and clear practitioner relevance, the strand offers limited longitudinal or causal evidence that corporate universities actually improve workforce or firm outcomes and almost no comparative work across institutions. This strand is the most directly relevant to HRM/HRD, yet it is smaller and, in citation terms, less visible.

### 3.5.2. Strand B corporate university as a critique of the corporatized academy (n = 37)

Strand B uses “corporate university” not to name a firm-based institution but to characterize what universities have become under managerialism. Here, the corporate university is an audit-driven, metricized, market-oriented academy rather than a structure to be designed. The thematic range is wide and normatively charged: the reshaping of academic governance and the rise of “academic capital” (Rowlands, 2013); managerialism, responsabilization, and metric governance of scholars (Amsler & Shore, 2017; Aarseth, 2022; Nørreklit et al., 2019); affective and gendered academic labor, precarity, and resistance (Sloniowski, 2016; Ashencaen Crabtree & Shiel, 2019; Charteris et al., 2016); student activism and its regulation (Brulé, 2015); and the politics of open access and scholarly communication. Recent contributions extend the critique to pandemic-era managerialism (Al Mahameed et al., 2024), the Americanization of business schools (Tikkanen, 2024), and programmatic alternatives such as a “syndicalist university” beyond the critique itself (Barrow, 2024).

The strand is rooted in critical social theory, Bourdieusian field analysis, Marxian and feminist political economy, and post-structural accounts of neoliberal subjectivity, with Readings's (1996) “university in ruins” and Bourdieu's (1988) *Homo Academicus* recurring as touchstones in the cited-reference network (**Figure 6**). Methodologically, it is dominated by conceptual essays, critical-theoretical arguments, autoethnography, and qualitative case studies, with comparatively little quantitative work. Its gap is the mirror image of Strand A's, rich in interpretation and critique, but thin on the kind of operational, evidence-based prescription that would help HR practitioners. The strand powerfully explains why corporatization is contested, but it is not designed to tell organizations how to develop people.

### 3.5.3. Cross-strand comparison and research gaps

The two strands are near mirror images when placed side-by-side. Strand A is structural, managerial, empirical, and prescriptive, but evidentially thin, while Strand B is conditional, critical, interpretive, and normatively rich, but operationally silent. They share a phrase and search space, but little else: different theories, methods, sources, and reference bases, with minimal cross-citation between them. The citation skew compounds the problem, concentrating visibility in Strand B, while the HRM/HRD-relevant evidence sits in the smaller, less-cited Strand A. Three gaps follow. First, there is an integration gap: no work draws the critical insights of Strand B (about power, measurement, and the limits of marketized learning) into the design and evaluation logic of Strand A. Second, there is an evidence gap within Strand A: claims about capability and performance effects rest on small, cross-sectional studies rather than longitudinal or comparative designs. Third, there is a context gap: despite contributions from emerging economies, there is little comparative analysis of how corporate-university models are adapted outside Anglo-American firms. These gaps frame the contribution and agenda set out below.

## 4. Discussion

The central result of this review is not a number but a distinction: the literature gathered under “corporate university” is two literatures, and conflating them has quietly weakened the evidence base that HRM and HRD draw upon. For a field concerned with developing human capital, the practically usable conversation is Strand A, yet our bibliometrics show it to be the smaller and less cited of the two, embedded in a corpus with no home journal and a citation distribution that rewards

critique over construction. Recognizing the split is therefore a precondition for cumulative progress: scholars and practitioners can now target the L&D strand deliberately rather than wading through critical higher education literature that, however valuable in its own right, does not answer HRD questions.

From an HRM/HRD perspective, Strand A positions the corporate university as a strategic human capital instrument—an organizational structure that converts learning investments into capabilities and, ultimately, performance. This is the same logic that animates competency-based approaches to training-needs analysis and workforce planning advanced in this journal, where development activity is explicitly tied to business performance (Altuntaş et al., 2026) and complements the move toward digitally mediated training and development within integrated HR strategies (Yang & Zhang, 2025). A corporate university can be considered an institutional container for these practices: a governed home for competency frameworks, digital learning, and talent management. Our finding that the strongest empirical signals in Strand A concern leadership development and firm performance (Nguyen & Fan, 2022) and knowledge management for lifelong learning (Han et al., 2024) suggests that the construct's HRD value lies less in training delivery per se than in its capacity to institutionalize learning as a strategic, measurable organizational function.

Strand B should not be discarded by HRD scholars but should metabolize it. Its sustained attention to measurement regimes, managerial control, and the unintended effects of marketizing learning is a caution for anyone designing a corporate university. If the critical literature is correct in that audit cultures can hollow out the substance of education in universities, then HRD designers have reason to ask whether the same dynamic metric fixation, credential inflation, and performative compliance threaten corporate universities' learning goals. The most generative move in the field is integrative: to let Strand B's critique of how learning is governed inform Strand A's prescriptions for what to build, producing corporate-university designs that are both strategically aligned and reflexive about their measurement and power effects.

This study resonates with how adjacent reviews in this journal handle fragmented educational and developmental evidence. Likewise, the systematic treatment of succession planning across higher education institutions confronts a dispersed literature and converts it into actionable guidance for talent continuity (Hoque & Zheng, 2024), and the HRD reading of university student entrepreneurship demonstrates the payoff of recasting an education topic explicitly as human capital development (Lee et al., 2025). Our review extends this trajectory by showing that the first analytical task for the corporate university is disambiguation; only after the two meanings are separated can HRD-relevant evidence be assembled, appraised, and built upon. Theoretically, this contribution is a clarified construct and map of where usable evidence lives. Practically, it offers HR leaders a more honest reading of corporate-university literature, much of which is about universities, not firms, and directs them to the smaller body of work that actually informs organizational L&D design.

Several limitations qualify for these claims. The review draws on a single database (Scopus), which, although broad, omits relevant work indexed only elsewhere; it is restricted to English-language, open-access, final-stage journal articles, biases that likely under-represent practitioner and non-Anglophone scholarship, and may inflate the apparent prominence of the critical strand. Strand assignment, while grounded in explicit criteria, involves interpretive judgment, and

a small number of boundary cases can be classified differently. Finally, the citation count is a lagging and field-dependent measure of influence. These constraints temper the bibliometric details, but not the core qualitative finding, which the term maps independently corroborates: the corporate-university literature is conceptually bifurcated.

## 5. Conclusion

This systematic review mapped scholarship on corporate universities from 2010 to 2026 and found a growing field (RQ1), but dispersed across 62 sources, citationally skewed, and without a dominant outlet. Its defining feature (RQ2) is a conceptual split: 22 articles treat the corporate university as an organizational learning-and-development institution, while 37 use it as a critique of the corporatized academy, and the two strands rarely meet. Each strand has a characteristic profile (RQ3): the L&D strand is empirical, managerial, and prescriptive, but evidentially thin, whereas the critical strand is interpretive and theory-rich, but operationally silent. The contribution of this review is to name and quantify this bifurcation and clarify that HRM/HRD-relevant evidence resides in the smaller, less-visible L&D strand. For human capital development, the actionable conclusion is that the corporate university is best understood as an institutional vehicle for strategic, measurable learning, one whose design should be informed, but not paralyzed, by the critical literature's warnings about governance and measurement. The principal limitations are the single-database, English-only, open-access scope, and interpretive nature of strand assignment.

## 6. Recommendations for future research

Four directions were followed directly from the identified gaps. First, the evidence base for Strand A should be strengthened through longitudinal and comparative designs that test whether corporate universities improve workforce capability and firm performance, moving beyond small cross-sectional cases to causal and multi-context evidence. Second, future reviews and primary studies should pursue integration, deliberately importing Strand B's insights on measurement, power, and the limits of marketized learning into the design and evaluation of corporate universities so that HRD prescriptions are reflexive rather than merely instrumental. Third, the corpus should be broadened beyond a single database and English-language, open-access sources, extending to the Web of Science, regional indexes, and grey/practitioner literature to correct the coverage biases noted above and better represent emerging economy adaptations, including the Indonesian and broader Asian contexts well represented in this journal's readership. Fourth, scholars should examine how digital and AI-enabled delivery is reshaping the corporate-university model, building on the resource-based and digital HR perspectives now appearing in HRM/HRD outlets and connecting them to measurable human capital outcomes.

**Author contributions:** Conceptualization, F.H.S.S. and J.J.; methodology, F.H.S.S. and A.S.; formal analysis, F.H.S.S.J.S., and A.M.; data curation, F.H.S.S., R.A.H., and H.H.; writing the original draft, F.H.S.S.; writing, reviewing, and editing, J.J.J.S.A.S., and R.M.; visualization, A.M.; supervision, J.J. J.S. All authors have read and agreed to the published version of the manuscript.

**Funding:** The authors declare that no external funding was received for the conduct of this research, data collection, analysis, or preparation of this article

**Acknowledgments:** This article uses Biblioshiny version 5.0 and VOSviewer version

1.6.20 as data processing tools. To visualize the processed results, Microsoft Excel was used to create extraction tables for Scopus articles, and Claude was used to enhance content readiness so that the language was easier to understand.

**Conflict of interest:** The authors declare no conflicts of interest regarding the publication of this study. This research was conducted independently, without any commercial or financial relationships that could be interpreted as potential conflicts of interest.

## References

1. Aarseth, H. (2022). The implicit epistemology of metric governance: New conceptions of motivational tensions in the corporate university. *Critical Studies in Education*, 63(5), 589–605. <https://doi.org/10.1080/17508487.2022.2037680>
2. Al Mahameed, M., Yates, D., & Gebreiter, F. (2024). Management as ideology: “New” managerialism and the corporate university during the COVID-19 pandemic. *Financial Accountability & Management*, 40(1), 34–57. <https://doi.org/10.1111/faam.12359>
3. Altuntaş, G., İnanç, Y., Bolelli, M., & Boz, C. (2026). Strategic human capital development in logistics: A competency-based training framework using the Fuzzy Best-Worst Method for evidence-based workforce planning. *Human Resources Management and Services*, 8(2). <https://doi.org/10.18282/hrms5856>
4. Amsler, M., & Shore, C. (2017). Responsibilization and leadership in the neoliberal university: A New Zealand perspective. *Discourse: Studies in the Cultural Politics of Education*, 38(1), 123–137. <https://doi.org/10.1080/01596306.2015.1104857>
5. Aria, M., & Cuccurullo, C. (2017). bibliometrix: R-tool for comprehensive science-mapping analysis. *Journal of Informetrics*, 11(4), 959–975. <https://doi.org/10.1016/j.joi.2017.08.007>
6. Ashencaen Crabtree, S., & Shiel, C. (2019). “Playing mother”: Channeled careers and the construction of gender in academia. *SAGE Open*, 9(3). <https://doi.org/10.1177/2158244019876285>
7. Barrow, C. W. (2024). What came after the critique of the corporate university? Toward a syndicalist university. *Emancipations*, 3(1), Article 1. <https://doi.org/10.55533/2765-8414.1091>
8. Blass, E. (2005). The rise of the corporate university. *Journal of European Industrial Training*, 29(1), 58–74. <https://doi.org/10.1108/03090590510576220>
9. Bourdieu, P. (1988). *Homo academicus* (P. Collier, Trans.). Stanford University Press.
10. Brulé, E. (2015). Voices from the margins: The regulation of student activism in the new corporate university. *Studies in Social Justice*, 9(2), 159–175. <https://doi.org/10.26522/ssj.v9i2.1154>
11. Cappiello, G., & Pedrini, G. (2017). Performance evaluation of corporate universities. *Tertiary Education and Management*, 23(3), 304–317. <https://doi.org/10.1080/13583883.2017.1329452>
12. Charteris, J., Gannon, S., Mayes, E., Nye, A., Stephenson, L. (2016). The emotional knots of academicity: A collective biography of academic subjectivities and spaces. *Higher Education Research & Development*, 35(1), 31–44. <https://doi.org/10.1080/07294360.2015.1121209>
13. Chin, T., Yang, Y., Zhang, P., Yu, X., & Cao, L. (2019). Co-creation of social innovation: Corporate universities are innovative strategies for Chinese firms to engage with society. *Sustainability*, 11(5), 1438. <https://doi.org/10.3390/su11051438>
14. Damayanti, A., Miftahuddin, A., Rofaida, R., Perdana, Y., Husna, R. A., & Juliana, J. (2026). Two decades in five years: Mapping digital HR, workflow automation, and innovation ecosystem research (2020–2025). *Daengku: Journal of Humanities and Social Sciences Innovation*, 6(2), 259–275. <https://doi.org/10.35877/454RI.daengku4894>
15. Ghomi, H., & Barzinpour, F. (2018). Identifying the success factors of knowledge management tools in research projects (case study: A corporate university). *Management Science Letters*, 8(8), 805–818. <https://doi.org/10.5267/j.msl.2018.6.006>
16. Han, Y., Zhou, Y., Carr, S., & Jiang, J. (2024). Lifelong learning in the workplace: The knowledge-management role of corporate universities in China. *Humanities and Social Sciences Communications*, 11, Article 189. <https://doi.org/10.1057/s41599-024-02693-3>
17. Hoque, K. E., & Zheng, C. (2024). Succession Planning in Higher Education: A Systematic Literature Review (2012–2022). *Human Resources Management and Services*, 6(4). <https://doi.org/10.18282/hrms3391>
18. Iskandar, I., Juliana, J., Miftahuddin, A., Marlina, L., Ridlwan, A. A., Marlina, R., & Inomjon, Q. (2026). Digital Literacy and Academic Productivity: A Human Capital Perspective in Higher Education. *Human Resources Management and Services*,

- 8(1). <https://doi.org/10.18282/hrms5793>
19. Kamarul Zaman, N.J.F., Ahmi, A., Ismail, S., Abd Samad, K., Juliana, J. (2025). Gig economy insights: key trends, influencers and research directions. *Global Knowledge, Memory and Communication*, Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/GKMC-07-2024-0456>
20. Kristiawan, M., Hendra, O., Macariola, J. S., Prayitno, H. J., & Amalia, D. (2025). From Classroom to Career: Adaptive Transformation of Higher Education through Work-based Learning. *Discover Education*, 4, Article 542. <https://doi.org/10.1007/s44217-025-00978-6>
21. Lee, H.-W., Jang, S.-H., & Jeong, J.-S. (2025). A literature review on university student entrepreneurship from a Human Resource Development (HRD) perspective. *Human Resources Management and Services*, 7(3), 4900. <https://doi.org/10.18282/hrms4900>
22. Lissillour, R., & Rodriguez-Escobar, J. A. (2023). Organizational ambidexterity and the learning organization: The strategic role of a corporate university. *The Learning Organization*, 30(1), 55–75. <https://doi.org/10.1108/TLO-01-2021-0011>
23. Moh, W., Sofia, A., Miftahuddin, A., Mustika, R., Juliana, J., Alif Rusmita, S., & Bakri, M. H. (2026). From Administrative Actors to Strategic Human Capital: Reconceptualizing Public Procurement Officers through a Human Capital Lens. *Human Resources Management and Services*, 8(3). <https://doi.org/10.18282/hrms6043>
24. Mora-Mora, D. P., Bernal-Torres, C. A., & Torres-Guevara, L. E. (2025). Corporate university model: Enhancing competitiveness in firms from emerging economies. *The Learning Organization*, 32(7), 153–175. <https://doi.org/10.1108/TLO-10-2023-0193>
25. Nguyen, H. L., & Fan, P. (2022). CEO education and firm performance: Evidence from corporate universities. *Administrative Sciences*, 12(4), Article 145. <https://doi.org/10.3390/admsci12040145>
26. Noor, R., Rahayu, A., Ratih Hurriyati, Wibowo, L. A., Ramini, N., Miftahuddin, A., Juliana, J., & Ismail, S. (2026). Human Capital Readiness for Cloud–AI–Data Center Ecosystems: A Bibliometric Review. *Human Resources Management and Services*, 8(3). <https://doi.org/10.18282/hrms6018>
27. Nørreklit, L., Jack, L., & Nørreklit, H. (2019). Moving towards digital governance of university scholars: Instigating a post-truth university culture. *Journal of Management and Governance*, 23(4), 869–899. <https://doi.org/10.1007/s10997-019-09489-7>
28. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... Moher, D. (2021). PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, Article n71. <https://doi.org/10.1136/bmj.n71>
29. Patrucco, A. S., Pellizzoni, E., Buganza, T. (2017). The design process of corporate universities: A stakeholder approach. *Journal of Workplace Learning*, 29(4), 304–318. <https://doi.org/10.1108/JWL-04-2016-0024>
30. Readings, B. (1996). *University in ruins*. Harvard University Press.
31. Roadkasamsri, V., Sensai, P., Saecheong, K., Anphanlam, A., & Teekalee, A. (2025). Enhancing cross-cultural design competencies: Integrating knowledge, innovation, and ethics for human capital development in global markets. *Human Resources Management and Services*, 7(4), 4728. <https://doi.org/10.18282/hrms4728>
32. Rohmana, Y., Utami, S. A., & Inomjon, Q. (2026). Higher education financing through Islamic endowment funds (Waqf): Literature review and lessons for university management. *Review of Islamic Economics and Finance*, 9(1), 127–152. <https://doi.org/10.17509/rief.v9i1.98347>
33. Rowlands, J. (2013). Academic boards: Less intellectual capital and more academic capital in higher education governance. *Studies in Higher Education*, 38(9), 1274–1289. <https://doi.org/10.1080/03075079.2011.619655>
34. Saychenko, O. (2026). Corporate universities go mobile: AI-powered education management for workforce training. *International Journal of Interactive Mobile Technologies*, 20(3), 18–29. <https://doi.org/10.3991/ijim.v20i03.60055>
35. Shakina, E., Barajas, Á., & Sánchez-Fernández, P. (2024). Revisiting corporate universities: Strategic choices shaping telecom performance. *Heliyon*, 10(14), Article e34314. <https://doi.org/10.1016/j.heliyon.2024.e34314>
36. Sloniowski, L. (2016). Affective labor, resistance, and academic librarian. *Library Trends*, 64(4), 645–666. <https://doi.org/10.1353/lib.2016.0013>
37. Taylor, S., Bell, E., Grugulis, I., Storey, J., & Taylor, L. (2010). Politics and power in training and learning: The rise and fall of NHS University. *Management Learning*, 41(1), 87–99. <https://doi.org/10.1177/1350507609350838>
38. Tikkanen, H. (2024). Towards Americanization and the corporate university in an elite business school: A leadership history

- of the Helsinki School of Economics/Aalto University School of Business, 1974–2022. *Business History*, 66(7), 1712–1734. <https://doi.org/10.1080/00076791.2023.2185224>
39. van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84(2), 523–538. <https://doi.org/10.1007/s11192-009-0146-3>
40. Woolley, J. P., McGowan, M. L., Teare, H. J. A., Coathup, V., Fishman, J. R., Settersten, R. A., ... Juengst, E. T. (2016). Citizen science or scientific citizenship Disentangling the uses of public engagement rhetoric in national research initiatives. *BMC Medical Ethics*, 17, Article 33. <https://doi.org/10.1186/s12910-016-0117-1>
41. Yang, L., & Zhang, L. (2025). Digital HR strategies and evaluation of their effectiveness in private enterprises under remote work: Evidence from Chongqing, China. *Human Resources Management and Services*, 7(3), 5401. <https://doi.org/10.18282/hrms5401>

## Appendix A. Data extraction of the included studies (n = 59)

*Systematic literature review on the corporate university/corporate academy (Scopus, 2010–2026). Strand A = corporate university as an organizational learning-and-development institution (n = 22); Strand B = corporate university as a critique of corporatized/neoliberal academy (n = 37). Studies were grouped by strand and ordered by year. Citation counts were retrieved from Scopus on June 8, 2026.*

| No. | Strand | Author (first)             | Year | Title                                                                                                               | Source title                                             | Cited by |
|-----|--------|----------------------------|------|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------|
| 1   | A      | Taylor S. et al.           | 2010 | Politics and power in training and learning: The rise and fall of the NHS university                                | <i>Management Learning</i>                               | 6        |
| 2   | A      | Tseng C.-N. et al.         | 2013 | Comparative study of an externship program versus a corporate-academic cooperation program for nursing competence   | BMC Medical Education                                    | 13       |
| 3   | A      | Baladrón Pazos A.J. et al. | 2013 | Corporate universities: An emerging actor in higher education in Spain                                              | RUSC: Revista de Universidad y Sociedad del Conocimiento | 2        |
| 4   | A      | Masalimova A.R. et al.     | 2014 | Distant in-company foreign language learning involving university students-tutors                                   | American J. of Applied Sciences                          | 24       |
| 5   | A      | Szoboszlai V. et al.       | 2014 | Post-experiential education: From knowledge to ‘knowing’                                                            | Acta Polytechnica Hungarica                              | 4        |
| 6   | A      | Patrucco A.S. et al.       | 2017 | The design process of corporate universities: a stakeholder approach                                                | Journal of Workplace Learning                            | 8        |
| 7   | A      | Cappiello G. et al.        | 2017 | The performance evaluation of corporate universities                                                                | Tertiary Education and Management                        | 17       |
| 8   | A      | Miroshin D.G. et al.       | 2017 | Corporate personnel training system                                                                                 | Eurasian J. of Analytical Chemistry                      | 2        |
| 9   | A      | Ghomi H. et al.            | 2018 | Identifying the success factors of knowledge management tools in research projects                                  | <i>Management Science Letters</i>                        | 18       |
| 10  | A      | Ghomi H. et al.            | 2018 | Assessment of student’s talent management in a corporate university                                                 | <i>Management Science Letters</i>                        | 2        |
| 11  | A      | Chin T. et al.             | 2019 | Co-creation of social innovation: Corporate universities as innovative strategies for Chinese firms                 | Sustainability                                           | 40       |
| 12  | A      | Legowo N. et al.           | 2019 | Influence of instructor readiness, IT capability, LMS content on e-learning effectiveness in a corporate university | Int. J. of Recent Tech. and Eng.                         | 2        |
| 13  | A      | Krishnamoorthy R. et al.   | 2021 | Education crisis, workforce preparedness, and COVID-19: Reflections and recommendations                             | American J. of Economics and Sociology                   | 17       |
| 14  | A      | Poma L. et al.             | 2021 | Industry 4.0 and internal knowledge management: corporate academies in Emilia-Romagna                               | Transnational Marketing Journal                          | 4        |
| 15  | A      | Byundyugova T. et al.      | 2022 | Visualization in learning as a factor in adult self-education motivation                                            | Int. J. of Media and Info. Literacy                      | 0        |
| 16  | A      | Nguyen H.L. et al.         | 2022 | CEO education and firm performance: Evidence from corporate universities                                            | Administrative Sciences                                  | 8        |

Continuation Table:

| No. | Strand | Author (first)           | Year | Title                                                                                                    | Source title                                   | Cited by |
|-----|--------|--------------------------|------|----------------------------------------------------------------------------------------------------------|------------------------------------------------|----------|
| 17  | A      | Lissillour R. et al.     | 2023 | Organizational ambidexterity and the learning organization: the strategic role of a corporate university | <i>The Learning Organization</i>               | 15       |
| 18  | A      | Shakina E. et al.        | 2024 | Revisiting corporate universities: Strategic choices shaping performance in telecom                      | Heliyon                                        | 3        |
| 19  | A      | Han Y. et al.            | 2024 | Lifelong learning in the workplace: knowledge management role of corporate universities in China         | Humanities and Social Sciences Communications. | 9        |
| 20  | A      | Mora-Mora D.P. et al.    | 2025 | Corporate university model: enhancing competitiveness in firms from emerging economies                   | <i>The Learning Organization</i>               | 0        |
| 21  | A      | Kristiawan M. et al.     | 2025 | From classroom to career: adaptive transformation of higher education through work-based learning        | Discover Education                             | 1        |
| 22  | A      | Saychenko O.             | 2026 | Corporate universities go mobile: AI-powered education management for workforce training                 | Int. J. Interactive Mobile Tech.               | 0        |
| 23  | B      | Sharma A. et al.         | 2013 | Darkmatter: Racial reconfigurations and networked knowledge production                                   | TripleC                                        | 1        |
| 24  | B      | Rowlands J.              | 2013 | Academic boards: Less intellectual and more academic capital in higher education governance              | Studies in Higher Education                    | 71       |
| 25  | B      | Brulé E.                 | 2015 | Voices from the margins: regulation of student activism in the new corporate university                  | Studies in Social Justice                      | 11       |
| 26  | B      | Jemielniak D. et al.     | 2015 | Wake up or perish: Neo-liberalism, the social sciences, and salvaging the public university              | Cultural Studies – Critical Method             | 39       |
| 27  | B      | Woolley J.P. et al.      | 2016 | Citizen science or scientific citizenship<br>Public engagement rhetoric in research initiatives          | BMC Medical Ethics                             | 153      |
| 28  | B      | Spitzer-Hanks D.T.       | 2016 | Process-model feminism in the corporate university                                                       | Gender and Education                           | 7        |
| 29  | B      | Charteris J. et al.      | 2016 | The emotional knots of academicity: a collective biography of academic subjectivities                    | Higher Education Research and Development.     | 42       |
| 30  | B      | Sloniowski L.            | 2016 | Affective labor, resistance, and the academic librarian                                                  | <i>Library Trends</i>                          | 49       |
| 31  | B      | Alajoutsijärvi K. et al. | 2016 | The “Dean’s Squeeze” revisited: a contextual approach                                                    | Journal of Management Development              | 14       |
| 32  | B      | Amsler M. et al.         | 2017 | Responsibilisation and leadership in the neoliberal university: a New Zealand perspective                | Discourse                                      | 42       |

Continuation Table:

| No. | Strand | Author (first)               | Year | Title                                                                                          | Source title                             | Cited by |
|-----|--------|------------------------------|------|------------------------------------------------------------------------------------------------|------------------------------------------|----------|
| 33  | B      | Arvanitakis J. et al.        | 2017 | Bellamy's Rage and Beer's conscience: pirate methodologies and the contemporary university     | Culture Unbound                          | 2        |
| 34  | B      | Bates A. et al.              | 2017 | Tackling knowledge 'like a business': Rethinking modernisation of higher education in Poland   | Compare                                  | 8        |
| 35  | B      | Rosyidi U.                   | 2018 | Managing corporate higher education: Indonesia's greatest challenge                            | New Educational Review                   | 1        |
| 36  | B      | Carton G. et al.             | 2018 | Strategic capacities in US universities: business schools as institutional builders            | Problems and Perspectives in Management. | 8        |
| 37  | B      | Willinsky J.                 | 2018 | The academic library and cooperative and commercial paths to open access                       | <i>Library Trends</i>                    | 9        |
| 38  | B      | Webster F. et al.            | 2019 | Doing science differently: assessing the careers of qualitative scholars in health sciences    | Int. J. of Qualitative Methods           | 12       |
| 39  | B      | Nørreklit L. et al.          | 2019 | Moving towards digital governance of university scholars: a post-truth university culture      | J. of Management and Governance          | 31       |
| 40  | B      | Ashencaen Crabtree S. et al. | 2019 | "Playing mother": channeled careers and the construction of gender in academia                 | <i>SAGE Open</i>                         | 69       |
| 41  | B      | Dolhinow R.E.                | 2020 | We don't need your permission: the era of non-affiliated student activism                      | <i>Radical Teacher</i>                   | 2        |
| 42  | B      | Ashencaen Crabtree S. et al. | 2020 | Donning the "slow professor": a feminist action research project                               | <i>Radical Teacher</i>                   | 5        |
| 43  | B      | Okune A. et al.              | 2021 | Conceptualizing, financing and infrastructuring: open access in and from Africa                | Development and Change                   | 11       |
| 44  | B      | Shek D.T.L. et al.           | 2021 | Subjective outcome evaluation of service-learning by service recipients                        | Child Indicators Research                | 36       |
| 45  | B      | De Chavez J.                 | 2021 | On the humanities (in times of) crisis                                                         | Rupkatha Journal                         | 0        |
| 46  | B      | Huỳnh V.M. et al.            | 2021 | Mobilizing BIPOC student power against liberalism at Soka University of America                | <i>Radical Teacher</i>                   | 1        |
| 47  | B      | Jaye C. et al.               | 2021 | Hidden in plain sight: transactions of moral capital in sick leave in the corporate university | <i>SAGE Open</i>                         | 1        |
| 48  | B      | Aarseth H.                   | 2022 | The implicit epistemology of metric governance in the corporate university                     | Critical Studies in Education            | 13       |
| 49  | B      | Hamilakis Y.                 | 2024 | 'Palestine is our working condition': border pedagogy and the corporate university             | Archaeological Dialogues                 | 2        |
| 50  | B      | Al Mahameed M. et al.        | 2024 | Management as ideology: "new" managerialism and the corporate university in COVID-19           | Financial Accountability and Management. | 21       |

Continuation Table:

| No. | Strand | Author (first)         | Year | Title                                                                                        | Source title                    | Cited by |
|-----|--------|------------------------|------|----------------------------------------------------------------------------------------------|---------------------------------|----------|
| 51  | B      | Spoelstra S.           | 2024 | Taking credit for stupidity: on being a student in the performative university               | <i>Management Learning</i>      | 2        |
| 52  | B      | Barrow C.W.            | 2024 | What comes after the critique of the corporate university? Toward a syndicalist university   | Emancipations                   | 2        |
| 53  | B      | Limaymanta C.H. et al. | 2024 | The 2014 university reform in Peru: changes in scientific practices of licensed universities | Información, Cultura y Sociedad | 1        |
| 54  | B      | Spivak G.C.            | 2024 | Teaching for a broken world                                                                  | Anglica                         | 3        |
| 55  | B      | Tikkanen H.            | 2024 | Towards Americanisation and the corporate university in an elite business school (1974–2022) | Business History                | 4        |
| 56  | B      | Mantzoukas S.          | 2025 | On thinking, nursing scholarship and the science of the unique                               | Nursing Philosophy              | 0        |
| 57  | B      | Tracy D.G. et al.      | 2025 | Humanities scholars' needs for open social scholarship platforms                             | First Monday                    | 2        |
| 58  | B      | Desille A. et al.      | 2026 | Collaborative filmmaking and (migrant) women's embodied experiences in Portuguese academia   | Ethnic and Racial Studies       | 2        |
| 59  | B      | Murrey A. et al.       | 2026 | Anti-imperial autoethnographies of family separation: feminist solidarities in the UK        | Antipode                        | 2        |

*Note. This appendix presents only the extracted bibliographic data; thematic synthesis and interpretation are provided in the main text.*