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THE METAVERSE AS A CATALYST FOR DIGITAL TRANSFORMATION
Impact on Business Processes and Corporate Applications: A Scoping Review

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ABSTRACT

The metaverse has emerged in business discourse as a catalyst for digital transformation; however, evidence regarding its practical application remains fragmented. This scoping review maps the empirical literature published between 2021 and 2026 on contract digitalisation, executive training, corporate events, multilingual communication, and workplace training. A total of 33 studies were included from 307 records identified in Scopus, revealing exponential growth in research output led by Asia and Europe. Workplace training accounts for 90.9% of the studies analysed, consolidating its position as the principal business application of the metaverse. A critical gap was identified between technical validation and the measurement of strategic impact. Future research should address this disconnect through more methodologically robust research designs.

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1. Introduction

The metaverse has become established as an immersive virtual environment that enables users to interact and collaborate through technologies such as Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR) (Gondane, 2023). In addition, Artificial Intelligence (AI), blockchain, and cloud computing can be considered integral components of the metaverse (Mystakidis, 2022). These technologies are not only redefining the user experience but are also revolutionising business models, optimising processes, and facilitating new forms of interaction within corporate and industrial environments.

It is important to emphasise that, in an increasingly digitalised world, organisations are constantly seeking ways to optimise operations, improve efficiency, and deliver innovative experiences to customers, employees, and stakeholders. This is reflected in the ongoing pursuit of operational efficiency and the need to adapt to competitive challenges. In this context, the metaverse emerges as a strategic tool for achieving these objectives, enabling the automation and digitalisation of processes, task automation, workforce training, and the creation of virtual collaborative environments. However, its adoption is not without challenges, including the need for advanced infrastructure and the associated costs, concerns regarding security, privacy, and data protection, as well as resistance to organisational change. According to Marty Resnick, Vice President at Gartner, by 2026, 30% of global organisations will have products and services adapted to the metaverse, driving significant innovation across a wide range of sectors (Gartner, 2023). Among the sectors with the greatest growth potential are:

- Retail: Development of immersive shopping experiences, such as Gucci's virtual stores on the Roblox platform.
- Manufacturing: Implementation of digital prototypes and advanced supply chain simulations, promoting more efficient and secure processes (Accenture, 2024).
- Training and Development: Currently, 51% of companies are either integrating virtual reality into their corporate strategies or have already implemented this technology in at least one specific business unit. Furthermore, 34% of organisations identify the availability of more effective methods for workforce training and development as one of the principal benefits of the metaverse (Likens, 2023). In addition, employee training in VR environments using avatars through the V-Learn method has been reported to increase knowledge retention by 40% compared with face-to-face classroom training and by 35% compared with online e-learning programmes (PwC, 2022).

McKinsey & Company examined the economic potential of the metaverse and its impact on business in a research report published in June 2023, identifying key opportunities and challenges. According to the report, the metaverse could generate up to US$5 trillion in economic value by 2030 (McKinsey, 2022). The study further estimates that the metaverse will have a particularly significant impact on three sectors, as shown in Table 1.

Table 1. Estimated impact of the metaverse on specific markets according to McKinsey & Company

Market	Estimated impact (USD)
Virtual Academic Learning	180–270 billion
Advertising	144–206 billion
Video games	108–125 billion

Source: Adapted from (McKinsey, 2022) .

As shown in Table 1, the metaverse is expected to have a significant impact on markets such as virtual academic learning, advertising, and video games (McKinsey, 2022), reinforcing the findings reported by PwC (2022). However, these effects may manifest themselves in very different ways across the value chain, driven by the adoption of metaverse technologies in sectors such as retail, manufacturing, and entertainment.

At present, leading organisations are using the metaverse to enhance customer experience, optimise operations, and develop new business models. Examples include virtual training programmes and virtual stores, the automation of business processes through artificial intelligence and virtual assistants in immersive environments, advanced personalisation of customer experiences through intelligent avatars and interactive environments, and the optimisation of remote collaboration through virtual workspaces that improve interaction and productivity. Nevertheless, the adoption of the metaverse faces

significant challenges, including the need for advanced technological infrastructure, data protection requirements, and cultural adaptation among executives and employees (McKinsey, 2022).

These findings support the relevance of the present scoping review and provide a useful framework for analysing the implementation of the metaverse in business environments. However, despite its potential, corporate adoption of the metaverse continues to face critical challenges, including technological fragmentation, skills gaps, and the absence of common regulatory standards (Shah, 2023).

There is a growing adoption of immersive technologies (including VR, AR, AI, and blockchain) within corporate environments; however, systematic evidence regarding their outcomes remains limited. Despite this momentum, empirical research continues to focus primarily on pilot studies and technical validations, with relatively little attention paid to the evaluation of actual organisational impact. This gap highlights the need for a review that synthesises the current state of knowledge regarding business applications of the metaverse.

The primary objective of this article is to conduct a systematic review of the impact of the metaverse as a tool for digital transformation in business processes. To achieve this objective, the following specific objectives are proposed:

- To explore the available evidence regarding the effectiveness of the metaverse in processes such as contract digitalisation, executive training based on immersive learning, the organisation of corporate events in virtual environments, multilingual communication through real-time machine translation, and technical workforce training in 3D environments.
- To examine which technologies, platforms, or specific tools demonstrate the highest levels of effectiveness, maturity, or adoption across these processes.
- To identify the distribution of the published studies according to year of publication and geographical region.
- To identify the limitations, evidence gaps, and research gaps highlighted in the current literature, as well as the aspects that should be addressed in future systematic reviews and empirical studies.

2. Methodology

This review followed the guidelines of the PRISMA-ScR checklist (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews*) in order to ensure the transparency and comprehensiveness of the review process (Tricco et al., 2018).

The search was intentionally limited to the Scopus database, which was selected due to its broad multidisciplinary coverage and the rigour of its indexing of scientific journals within the field of interest. No manual searches of reference lists or grey literature repositories were conducted, as the scope of this review was focused on identifying and mapping the core literature indexed in a principal database. Priority was therefore given to reproducibility and thematic delimitation rather than to absolute comprehensiveness.

2.1. Eligibility Criteria

To ensure the relevance and quality of the studies included, eligibility criteria were established in alignment with the central objective of the research: to analyse how the metaverse acts as a catalyst for digital transformation in business processes and corporate applications.

Inclusion Criteria

Studies were considered eligible if they explicitly addressed the use of the metaverse in organisational contexts, with particular attention to the following five strategic areas of application: contract digitalisation, executive training, corporate events, multilingual communication, and workplace training.

In addition, studies incorporating technologies associated with the metaverse, such as Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), and Artificial Intelligence (AI), were included, provided that these technologies were applied within corporate environments. Publications written in English and published between 2021 and 2026 were also considered, as this period has witnessed a significant intensification in the development and implementation of metaverse technologies within the business sector. Given the emerging nature of the topic and the broad scope characteristic of a scoping review, the review considered not only journal articles but also technical reports, white papers, academic theses, and other relevant documents.

Exclusion Criteria

Studies focusing exclusively on the use of the metaverse for recreational purposes, video games, social networking, or personal experiences without organisational application were excluded. Documents that mentioned the metaverse only superficially, without providing empirical evidence, contextual analysis, or a clear connection to the business processes outlined above, were also excluded. Likewise, publications written in languages not understood by the authors and lacking either a translation or an accessible summary in the selected language were not considered.

Although this review adopted a broad search strategy to capture the widest possible range of available evidence, rigorous thematic and contextual filters were applied to ensure the relevance of the selected studies in relation to the research objective. This approach enabled a balance between breadth and depth of analysis while adhering to the methodological principles of a scoping review.

2.2. Search Strategy

The search was intentionally limited to the Scopus database, a decision based on its multidisciplinary coverage and its recognised reliability in indexing scientific literature on immersive technologies and digital transformation. The search strategy was structured around combinations of the main keyword and the different application domains under investigation, as detailed in Table 2. The search syntax was adapted to the specific requirements of the platform, with a cut-off date of January 2026, allowing the results to be restricted to the period characterised by the most significant development and implementation of metaverse technologies in business environments.

Table 2. Keyword and application topics used in the search strategy

Keyword	Application topics (associated terms)	Search query
Metaverse	Contract Digitisation / Digital Contracts / Smart Contracts	TITLE-ABS (metaverse AND contract AND digitisation) AND PUBYEAR > 2021 AND PUBYEAR < 2026
	Executive Training / Leadership Development / Management Training	TITLE-ABS (metaverse AND executive AND training) AND PUBYEAR > 2021 AND PUBYEAR < 2026
	Corporate Events / Business Events / Virtual Conferences	TITLE-ABS (metaverse AND corporate AND events) AND PUBYEAR > 2021 AND PUBYEAR < 2026
	Multilingual Communication / Real-time Translation / Language Accessibility	TITLE-ABS (metaverse AND Multilingual AND Communication) AND PUBYEAR > 2021 AND PUBYEAR < 2026
	Workplace Training / Employee Training / Corporate Training	TITLE-ABS (metaverse AND Workplace AND Training) AND PUBYEAR > 2021 AND PUBYEAR < 2026

Source: Authors' own elaboration, 2025.

The search terms were primarily applied to the title and abstract fields. Occurrences within the full text were also considered when necessary. The search syntax was adapted to the specific characteristics of the database, employing Boolean operators and date filters whenever compatible, thereby ensuring the currency and relevance of the retrieved literature.

In addition, a snowballing technique was applied to examine the reference lists of the studies initially selected in order to identify further relevant literature. The entire selection process followed the predefined eligibility criteria and was conducted manually by the authors in two stages: first, through a screening of titles and abstracts, and subsequently through a full-text review to confirm final inclusion.

2.3. Data Extraction

Data extraction was conducted using a structured approach based on the methodological guidance provided by the Joanna Briggs Institute (JBI, 2018) for scoping reviews. To this end, a data extraction matrix was developed to systematically collect the most relevant information from each included study, with the aim of mapping the characteristics, applications, and key findings related to the use of the metaverse, digital environments, and virtual worlds in business contexts.

The extracted data included the following categories: complete bibliographic reference (author, year, title, and source), country or region of study, study objective, methodological design, technology employed (metaverse, VR, AR, MR, AI, etc.), application context (business sector and functional area), main topic addressed, key findings, identified limitations, and the study's recommendations.

The extraction process was carried out manually by the authors using a spreadsheet specifically designed for this review. Each study was analysed individually, ensuring consistency in data recording and facilitating subsequent thematic coding and narrative analysis.

Particular attention was paid to identifying both empirical and conceptual evidence, with a specific focus on immersive technologies applied to organisational processes and the strategic benefits reported. This approach provided a solid foundation for the synthesis of findings and the identification of gaps in the existing literature.

2.4. Quality Assessment

To ensure that the synthesis was grounded in studies meeting a minimum standard of rigour and transparency, the following assessment criteria were applied during the data extraction and analysis phases:

1. Methodological Adequacy Criteria: For each included study, the research design (qualitative, quantitative, review-based, or technological development) was assessed to determine whether it was appropriate and clearly described in relation to the stated objectives.
2. Transparency Criteria: Studies were examined to verify whether they provided a sufficient description of: (a) the sample or data source, (b) data collection procedures, (c) the analytical method employed, and (d) the principal limitations of the study.
3. Classification for Synthesis: Rather than assigning a numerical score, studies were pragmatically classified according to their level of methodological detail and adequacy (High, Moderate, or Basic) in order to inform the discussion regarding the strength of the available evidence. This assessment did not result in the exclusion of any studies; however, it enabled the findings to be contextualised and the conclusions derived from different types of evidence to be weighed accordingly.

2.5. Study Selection

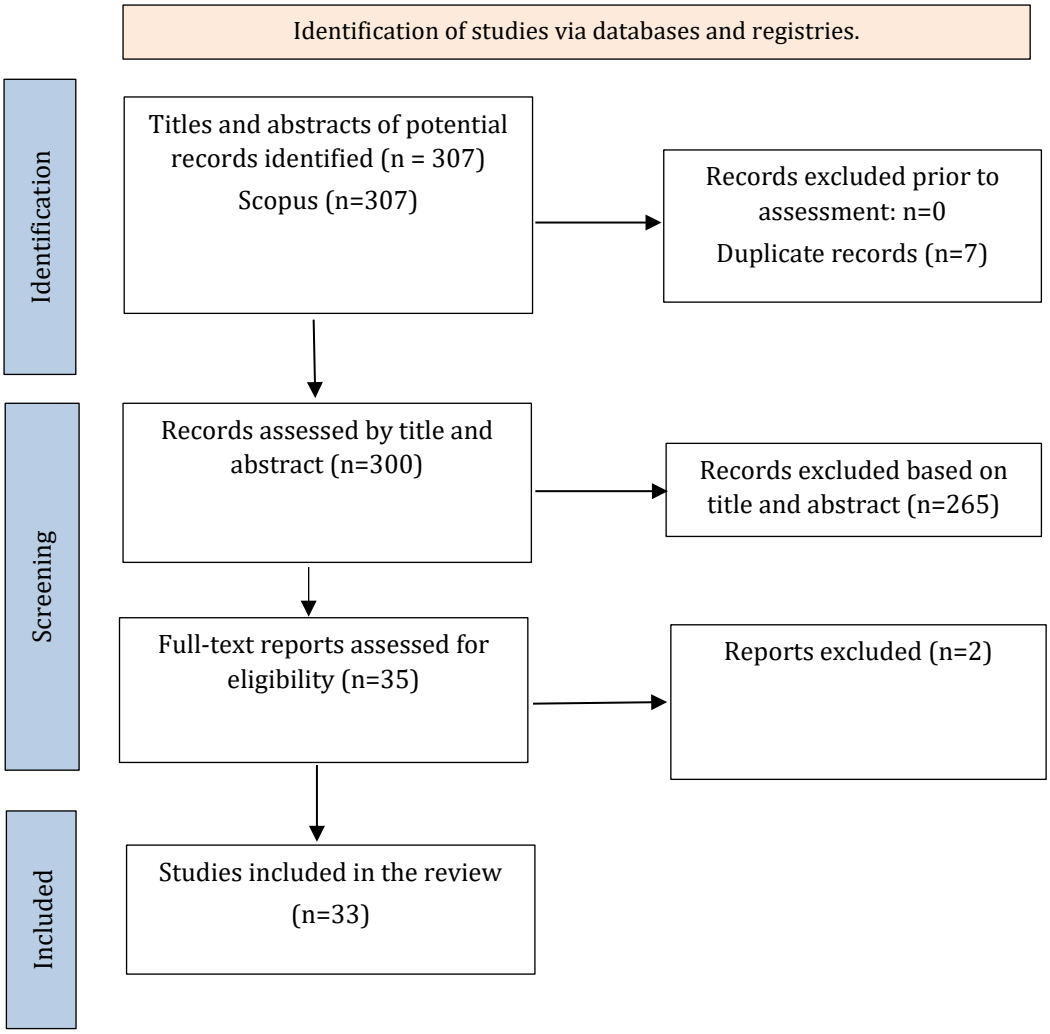
The selection of studies was conducted in several stages in accordance with the guidelines established in the PRISMA-ScR protocol. In the initial phase, a comprehensive search was carried out in the Scopus academic database using the keywords and application domains listed in Table 2. The search covered the period from January 2021 to January 2026 and identified a total of 307 records related to the metaverse.

Following the identification stage, duplicate records were removed and a title and abstract screening process was conducted, excluding studies deemed irrelevant or outside the thematic scope of the review. The preselected documents subsequently underwent a full-text assessment to determine whether they met the predefined eligibility criteria. Studies that did not directly address the use of the metaverse, digital environments, or virtual worlds in business contexts were excluded.

Excluded Reports (n = 2): Two reports were excluded during the full-text assessment stage due to thematic misalignment with the objective of the review, as their primary focus was on the video game sector and therefore fell outside the predefined analytical criteria established for this study.

Figure 1 presents the flow diagram of the study selection process in accordance with the PRISMA-ScR guidelines.

Figure 1. PRISMA-ScR Flow Diagram of the Study Selection Process



Source: Authors' own elaboration, 2025.

The flow diagram presented in Figure 1 provides a graphical summary of the study selection process. Of the 307 records initially identified in Scopus, 7 duplicates were removed, leaving a total of 300 references for title and abstract screening. Of these, 265 were excluded because they were not aligned with the objectives of the study or fell outside the business context. The remaining 35 documents underwent full-text review, during which a further 2 studies were excluded after it was determined that their primary focus was on the video game sector rather than on business processes. Following these successive screening stages, the final sample comprised 33 studies that met all the predefined eligibility criteria. The analysis of these 33 studies forms the basis of the results presented in the following section.

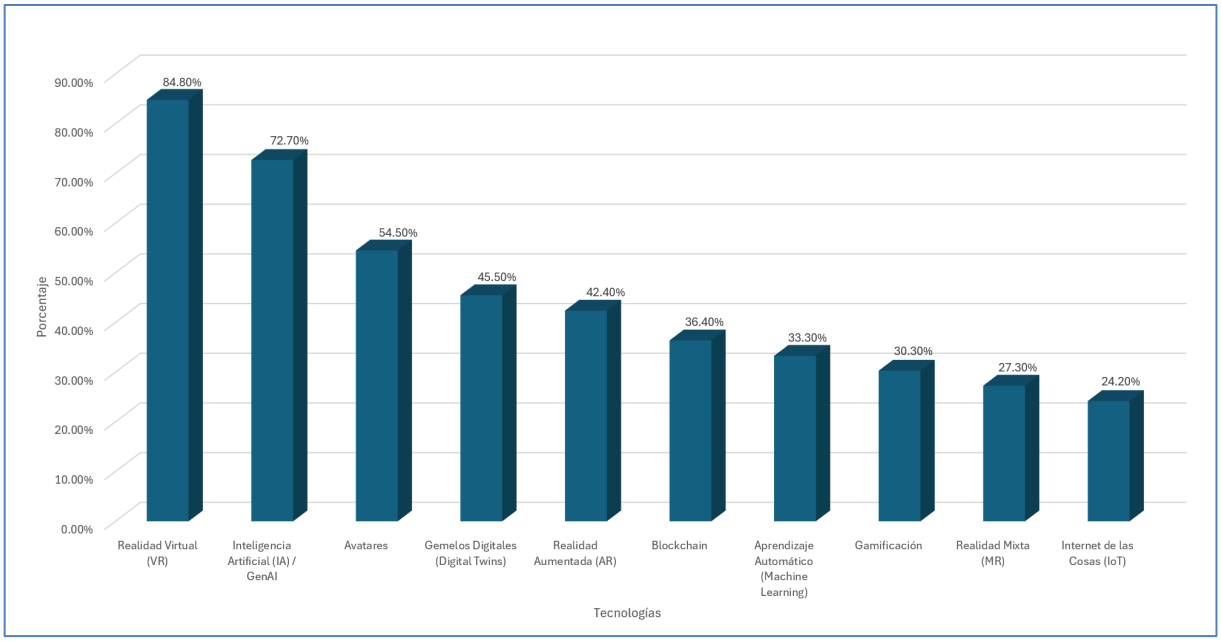
3. Results

Appendix 1 provides a synthesis of the studies included in this review, which focus on the application of the metaverse and related immersive technologies to improve business processes within organisational environments.

3.1. Results by Metaverse Application Area

Figure 2 presents the ten most frequently reported technologies identified in the studies analysed, which together account for the most significant mentions within the documentary corpus. The prevalence of Virtual Reality (VR), reported in 84.8% of the studies, indicates that most metaverse applications continue to rely on advanced immersive environments.

Figure 2. Ten most frequently reported technologies in the literature reviewed (n=33)



Source: Authors' own elaboration, 2025.

Note: As individual studies may refer to multiple technologies, percentages were calculated based on the total number of studies included in the review (N = 33).

The findings clearly show that Virtual Reality (VR) leads the ranking, being present in 84.8% of the studies, followed closely by Artificial Intelligence (AI), which appears in 72.7%. These are followed, albeit at more moderate levels, by avatars (54.5%) and digital twins (45.5%). A second group of technologies, with frequencies ranging between 20% and 40%, includes Augmented Reality (AR) (42.4%), blockchain (36.4%), machine learning (33.3%), gamification (30.3%), Mixed Reality (MR) (27.3%), and the Internet of Things (IoT) (24.2%).

The remaining technologies were reported in fewer than 20% of the studies. These include Large Language Models (LLMs) (21.2%), cloud computing (21.2%), chatbots (18.2%), softbots (18.2%), sensors (18.2%), Extended Reality (XR) (15.2%), big data (15.2%), haptic technologies (12.1%), robotics (12.1%), and virtual workspaces (12.1%). Technologies reported in less than 10% of the studies include Unreal Engine (9.1%), computer vision (9.1%), neural networks (9.1%), Microsoft Mesh (9.1%), and virtual factories (9.1%). Finally, several technologies were identified in approximately 6% of the studies, including Intelligent Tutoring Systems (ITS) (6.1%), Building Information Modelling (BIM) (6.1%), telemedicine (6.1%), and holography (6.1%). The least frequently reported technologies were lip synchronisation (3.0%) and the Gather platform (3.0%). Together, these technologies contribute to the development of a wide range of applications associated with the topic examined in this study.

3.2. Results by Year and Region

A further cross-cutting finding emerging from this review is the quantitative evidence of the recent emergence and rapid expansion of the field, as well as its geographical distribution, which is presented in Table 3. The temporal analysis of the relevant literature included in the review reveals a distribution strongly concentrated in the most recent years. Whereas only 6.1% of the studies were published in 2022, this figure increased to 21.2% in 2023 and rose to 33.3% in 2024. The year 2025 alone accounts for 39.4% of the academic output analysed.

This trend indicates that more than 72% of the knowledge base has been generated during the most recent two-year period (2024–2025), confirming that research on the application of the metaverse to business processes and corporate training is not only highly topical but is also undergoing a phase of rapid expansion and consolidation.

Table 3. Distribution of studies by publication year and region

Year	% of papers	Region	% by region
2022	6.1%	Asia	54.5%
2023	21.2%	Europe	33.3%
2024	33.3%	America	9.1%
2025	39.4%	Africa	3.0%
Total	100%		100%

Source: Own compilation. 2025

Geographically, the scientific output analysed shows a marked concentration. Asia leads the field, accounting for 54.5% of the studies (18 papers), followed by Europe with 33.3% (11 papers). The Americas represent 9.1% (3 papers), while Africa is represented by a single study, accounting for 3.0% of the total. This distribution suggests that, although interest in the topic is global, leadership in the generation of empirical and theoretical knowledge rests predominantly with Asian institutions, supported by a significant contribution from Europe.

Therefore, this review not only synthesises knowledge generated during the most productive and recent phase of the field but also provides an essential snapshot of its geopolitical knowledge landscape. This overview is crucial for researchers and practitioners seeking to understand the current state of the art, identify regional gaps in the literature, and anticipate the future trajectory of a field that is both dynamic and uneven in its global development.

3.3. Distribution by Application Topic

The thematic analysis further reveals that the identified applications can be grouped into five principal categories, corresponding to the application domains examined in this study, as shown in Table 4.

Table 4. Distribution of the 33 papers analysed by application topic

Application Topic (Associated Term)	Number of Relevant Papers	Percentage (%)
Workplace Training / Employee Training / Corporate Training	30	90.90%
Executive Training / Leadership Development / Management Training	6	18.20%
Corporate Events / Business Events / Virtual Conferences	5	15.20%
Multilingual Communication / Real-time Translation / Language Accessibility	3	9.10%
Contract Digitisation / Digital Contracts / Smart Contracts	2	6.10%
Grand Total (n=33)	46*	139.5%*

Source: Authors' own elaboration, 2025

**Note: An individual paper may be relevant to more than one topic (for example, a study on leadership training in the metaverse may be classified under both Executive Training and Workplace Training). Consequently, the overlap sum of the relevant papers (46) and the cumulative percentage (139.5%) exceeds the total number of papers analysed (33). This reflects the multidimensional and interconnected nature of metaverse applications in business processes.*

1. Workplace Training and Skills Development: This was the most frequently identified application area, appearing in 30 studies. It encompasses technical training, safety training, soft-skills development, and specialised training for industrial and healthcare environments.
2. Corporate Events and Collaboration: Five studies examined the use of the metaverse for virtual conferences, job fairs, and remote collaboration spaces.
3. Executive Training and Leadership Development: Six studies explored the potential of the metaverse for leadership development and the transfer of tacit knowledge.
4. Multilingual Communication: Three studies focused on real-time translation solutions and avatar-based systems designed to facilitate cross-cultural interaction.
5. *Contract Digitalisation: Two studies examined the integration of blockchain technology and smart contracts into contractual processes.*

This distribution highlights the metaverse not as a single technology, but as a multifaceted platform whose principal impact is observed in the transformation of training, learning, and talent development within organisations.

3.4. Results by Research Design

The studies included in the review reflect a field of research that remains at an early stage of development, characterised by the predominance of small-scale experimental designs and pilot studies. Four main methodological categories were identified:

1. Quantitative Experimental Designs (n = 14): Quasi-experimental designs with control and experimental groups predominate (e.g., Bartolotta et al., 2024; Raman et al., 2025). These studies primarily employ self-report measures (e.g., questionnaires assessing attitudes, perceived competence, and satisfaction) and, to a lesser extent, objective performance metrics (e.g., simulation accuracy and task completion time). The study by Nair and Tare (2024) provides a notable example of statistical analysis conducted using SPSS (Statistical Package for the Social Sciences).
2. Qualitative and Mixed-Methods Research (n = 9): This category includes detailed case studies (e.g., Wang et al., 2025), semi-structured interviews and observational approaches (e.g., Kondrateva et al., 2025), as well as mixed-methods designs that combine qualitative and quantitative techniques to achieve a more comprehensive understanding of user acceptance and experience (e.g., Angerbauer et al., 2025).
3. Literature Reviews and Conceptual Analyses (n = 8): This category comprises scoping reviews (e.g., Tabassum et al., 2025), narrative reviews (e.g., Lim et al., 2024), bibliometric analyses (e.g., Rajan & Niranjan, 2025), and book chapters that synthesise theoretical frameworks and emerging trends.
4. Technological Development and Proofs of Concept (n = 2): These studies focus on the development and initial validation of specific technological prototypes or architectures designed for metaverse applications (e.g., Kaarlela et al., 2023; Zambiasi et al., 2023).

A noteworthy methodological finding is the absence of a standardised comparative framework. While some studies compare metaverse-based training with traditional approaches (face-to-face instruction or two-dimensional e-learning), others focus on comparing different levels of immersion within the metaverse itself (e.g., VR versus desktop-based environments) or simply evaluate the effectiveness of a single intervention without the inclusion of a control group. This methodological heterogeneity highlights the need for the development of more robust and comparable evaluation protocols in future research.

3.5. Methodological Quality Assessment

None of the studies included in the review employed a large-scale longitudinal design capable of establishing a direct causal relationship between metaverse adoption and definitive business performance metrics, such as return on investment (ROI) or productivity gains. The assessment focused on methodological adequacy in relation to the objectives stated in each study, drawing upon the criteria proposed for scoping reviews (PRISMA-ScR) and the critical appraisal of primary research designs.

The findings indicate a level of methodological quality appropriate for an exploratory stage of research, with a clear distribution across three categories:

- *High methodological adequacy (n = 15):* This category includes studies that clearly describe their research design, provide detailed information regarding the sample and data collection procedures, and explicitly discuss their limitations. It includes systematic and scoping reviews such as those by Tabassum et al. (2025) and Raman et al. (2025); experimental studies such as Bartolotta et al. (2024) and Ramasamy et al. (2025); robust qualitative research such as Kondrateva et al. (2025); and bibliometric analyses such as Rajan and Niranjan (2025).
- *Moderate methodological adequacy (n = 14):* This category comprises studies with clearly defined objectives and appropriate research designs, but in which the description of the sample, analytical procedures, or study limitations is less comprehensive. Examples include pilot studies and proof-of-concept investigations such as those conducted by Wang et al. (2025) in the construction sector, Weng (2023) in virtual factory environments, and Poonkuzhali et al. (2024)

in music training for individuals with intellectual disabilities. Exploratory qualitative studies, such as Lau (2022) on tacit knowledge transfer, and book chapters combining literature review with conceptual proposals, such as those by Yadav et al. (2025) and Aluri (2025), also fall within this category.

- *Basic methodological adequacy (n = 4):* This category includes conceptual chapters and brief technological descriptions that fulfil their purpose of proposing frameworks or illustrating use cases, but where methodology is not the primary focus and is therefore not described in detail. Examples include Gupta et al. (2022) on collaborative 3D environments, Sethuraman et al. (2022) on authentication in the metaverse, and introductory chapters such as those by Reddy et al. (2024) in the healthcare sector and Dimitriou et al. (2024) in human resources.

The most common reasons for not achieving a higher methodological rating were: (1) small or non-representative samples, often consisting of employees from a single organisation or university students, which limits the generalisability of the findings; (2) the absence of reported validation procedures for ad hoc measurement instruments; and (3) insufficient description of analytical procedures in qualitative and mixed-methods studies.

This quality profile is consistent with an emerging and applied field of research, in which the initial priority has been to demonstrate feasibility, explore use cases, and propose theoretical frameworks before progressing towards large-scale confirmatory studies.

4. Discussion

It is now important to consider the broader implications of the findings presented. The question guiding this study was how metaverse technologies contribute to digital transformation in business settings, with particular attention to five organisational processes. The results paint a mixed picture: there are areas in which the evidence is robust and consistent, and others in which research remains at a very early stage. Rather than representing a limitation, this unevenness helps clarify both the current state of the field and the directions that future research should pursue.

To begin with, and in response to the first specific research question, the available evidence regarding the effectiveness of the metaverse across the five application topics is distributed very unevenly. The area attracting the greatest scholarly attention, represented by 30 of the 33 studies analysed, is workplace training in three-dimensional environments. In this domain, the literature consistently reports improvements in knowledge retention, training safety, and the transfer of learning to the workplace. Studies such as those by Zambiasi et al. (2023) and Kaarlela et al. (2023), for example, demonstrate how virtual environments enable workers to be trained in high-risk tasks without exposing them to real-world hazards. Similarly, experimental studies such as those conducted by Bartolotta et al. (2024) and Raman et al. (2025) provide robust comparisons between immersive training and more traditional instructional formats, reporting favourable outcomes for the former in terms of learner concentration and confidence.

The situation is somewhat different in the case of executive training. Here, the evidence base is considerably smaller, comprising only six studies, including those by Lim et al. (2024) and Lau (2022). These investigations point to promising outcomes in the development of leadership skills and the transfer of tacit knowledge between experienced professionals and less experienced colleagues. However, it is important to note that the available evidence in this area remains predominantly qualitative and exploratory in nature. Any attempt to draw broad generalisations would therefore be premature at this stage.

A similar picture emerges with regard to corporate events in virtual environments. The five studies addressing this topic, such as those by Dimitriou et al. (2024) and Bansal and Lampou (2024), consistently highlight improvements in participants' sense of presence and in the cohesion of remote teams. Nevertheless, there is still a lack of rigorous studies assessing the impact of such events on outcomes such as productivity or participant retention, which clearly represents an important avenue for future research.

Even more nascent is the field of multilingual communication supported by real-time translation. This remains an emerging area in which only the first tangible developments are beginning to appear. The three studies identified, most notably that of Rafiei Oskooei et al. (2025), document significant technical advances, particularly in relation to lip synchronisation and integration with language models. However, the evidence regarding their effectiveness in real-world business settings remains extremely

limited, and it is likely that several more years will be required before their organisational impact can be assessed with any degree of confidence.

Perhaps the most striking case, where the disparity between the promises surrounding the technology and the available research is most apparent, concerns contract digitalisation through smart contracts. Only two studies, those by Kliestik et al. (2024) and Sethuraman et al. (2022), address this topic, and both do so primarily from a technical perspective, focusing on issues of security and feasibility rather than on effectiveness in real organisational contexts. Nevertheless, it is reasonable to expect that this area will gain prominence in the coming years as platforms mature and confidence in decentralised transactions increases. For the time being, however, it remains a largely unexplored field.

Turning to the second research question, concerning the technologies, platforms, and tools that demonstrate the highest levels of effectiveness, maturity, or adoption, the analysis reveals a landscape that is both diverse and highly specialised. In the area of workplace training, Virtual Reality (VR) and digital twins emerge as the most established technologies, having reached a level of maturity that already enables their implementation in industrial and healthcare settings. In executive training, by contrast, intelligent avatars and softbots are beginning to gain prominence, although their adoption remains far from widespread.

With regard to corporate events, platforms such as Microsoft Mesh and Gather frequently appear in the literature as viable and mature solutions for remote collaboration. In the field of multilingual communication, Large Language Models (LLMs) and lip-synchronisation technologies constitute the technical foundation of emerging solutions, although their actual deployment in business environments remains limited. Finally, in the contractual domain, blockchain and smart contracts represent the leading technologies; however, their application within business-oriented metaverse environments remains, as previously noted, largely at a conceptual or proof-of-concept stage.

In other words, rather than converging towards a single dominant platform, what is beginning to emerge is an ecosystem of solutions tailored to highly specific organisational needs, with varying levels of development and adoption depending on the business process under consideration.

With regard to the third objective, namely the geographical and temporal distribution of the literature analysed, the findings point to a field undergoing rapid expansion. From a temporal perspective, more than 72% of the studies were published during the period 2024–2025, highlighting the recent growth of this area of research. In geographical terms, Asia (54.5%) and Europe (33.3%) together account for 87.8% of the scientific output, reflecting a marked regional imbalance in the production of knowledge.

The fourth issue concerns the limitations and gaps identified within the existing literature. In this respect, the analysis highlights at least four areas that warrant particular attention in future research. Perhaps the most significant from a business perspective is the absence of longitudinal studies capable of establishing causal relationships between metaverse adoption and organisational performance indicators such as productivity, return on investment, or talent retention. Almost all of the studies reviewed focus on perceptions, satisfaction, or immediate outcomes, without addressing medium- or long-term strategic impact.

A second limitation relates to the restricted generalisability of the findings. Most empirical studies rely on small and often unrepresentative samples, typically comprising employees from a single organisation or university students, making it difficult to extrapolate their conclusions to other organisational settings. This issue is compounded by the limited validation of measurement instruments, particularly in qualitative studies, where descriptions of analytical procedures do not always provide the level of detail necessary to ensure the reliability of the findings. Finally, the near absence of empirical research in the areas of contract digitalisation and multilingual communication deserves particular attention. In both domains, the transformative potential frequently attributed to these technologies stands in stark contrast to the scarcity of available evidence.

It is important to recognise that the metaverse is currently undergoing a transition from conceptual speculation to applied validation, with workplace training emerging as its most prominent and mature application area (see Table 4). The remaining application topics, despite their considerable potential, still require substantial research efforts to address the identified gaps and overcome the methodological limitations that continue to constrain the field. Only once these challenges have been addressed will it be possible to assess more fully the true impact and strategic value of the metaverse in business processes.

5. Future Research Direction

In light of the mapping exercise undertaken in this review, it is worth considering the directions that future research should pursue. The evidence synthesised here points to at least five lines of inquiry that warrant particular attention.

One of these concerns the theoretical foundations underpinning current research. A striking feature of the literature reviewed is that a substantial proportion of studies are descriptive in nature, focusing primarily on exploring use cases or assessing the initial acceptance of technologies, while only rarely drawing upon established theoretical frameworks. For the field to mature, it would be beneficial to integrate and test theories that have already been extensively validated in disciplines such as management science, organisational behaviour, and the psychology of learning within metaverse environments. The challenge, in other words, is no longer simply to describe what is happening, but rather to explain why it occurs and under what conditions.

A second line of inquiry, closely related to the first, concerns the need to move beyond users' perceptions. Most existing studies are limited to measuring satisfaction, trust, or intention to use, whereas very few assess the actual impact of these technologies on organisational performance. Put differently, we still know relatively little about the extent to which metaverse adoption translates into improvements in productivity, talent retention, or cost reduction. Without this type of evidence, and without reasonably reliable estimates of return on investment, academic findings are unlikely to provide meaningful support for organisational decision-makers.

There is also an issue of research focus. As noted throughout this review, workplace training accounts for the vast majority of the existing literature, yet other business processes that are equally strategic have received comparatively little attention. Questions remain, for example, regarding the use of digital twins in supply chain management, collaborative product design in immersive environments, customer service within virtual spaces, and the implementation of smart contracts. Judging from the findings of this review, these areas remain at a very early stage of development, and future research would benefit from helping to balance the relative attention devoted to the different application topics.

The limitations identified are not solely thematic but also methodological. Most empirical studies rely on small and often unrepresentative samples, typically consisting of employees from a single organisation or university students, which severely restricts the generalisability of their findings. This is compounded by the limited use of validated measurement instruments and the near absence of standardised comparison protocols. It is striking, for example, that very few studies compare the effectiveness of metaverse-based solutions with that of traditional two-dimensional collaborative tools such as Microsoft Teams, Zoom, or Google Workspace. When such comparisons are undertaken, they are often based on such disparate criteria that meaningful synthesis becomes impossible. The situation is not substantially better in qualitative research, where descriptions of analytical procedures are frequently so brief that assessing the reliability of the findings becomes difficult. Progress towards greater methodological maturity therefore appears essential if the field is to gain credibility.

Finally, future research should address issues related to ethics, security, and governance within these emerging environments. Despite their importance, these topics have received only limited attention in the literature reviewed. Data privacy in immersive environments, the security of digital assets, the prevention of abusive behaviour, and the development of appropriate governance frameworks for these new forms of workplace interaction are all critical concerns if large-scale organisational adoption is to become a reality. Ignoring such issues would be risky, given their central importance to the widespread adoption of metaverse technologies in business contexts. Researchers should therefore devote far greater attention to these challenges if the field is to develop in a responsible and sustainable manner.

6. Limitations of This Scoping Review

This review is subject to several limitations inherent to its design and scope. First, as the primary objective was to map the existing literature, no comprehensive critical appraisal of the methodological quality of individual studies was conducted, nor was a formal risk-of-bias assessment performed. Second, the search strategy was limited to the Scopus database, which means that relevant contributions indexed in other databases or contained within the grey literature, such as technical reports, industry publications, or non-indexed conference proceedings, may have been overlooked. Third, given the rapid pace at which this field is evolving, studies published after the search period are not included in the present review. Finally, the focus on specific business applications of the metaverse may have excluded

studies addressing the development of the underlying technological infrastructure, despite its critical importance for the long-term evolution and scalability of the applications examined.

7. Conclusion

This scoping review demonstrates that the metaverse has moved beyond the stage of conceptual speculation and entered a phase of experimentation and applied validation within business contexts. The available evidence consistently highlights its greatest potential in the transformation of human capital–related processes, with immersive workplace training emerging as its most extensively documented and promising application. At the same time, the review identifies emerging strategic applications in collaboration, communication, and contract digitalisation, pointing towards a broader ecosystem of organisational transformation.

The principal gap identified concerns the disconnect between the validation of user experiences and technical feasibility on the one hand, and the quantification of strategic business value on the other. There remains a shortage of research capable of moving beyond pilot studies and positive user perceptions to provide rigorous causal and economic evidence regarding the impact of metaverse technologies on organisational outcomes. Addressing this gap constitutes the next major challenge for the research community. Successfully overcoming it will be essential if the metaverse is to evolve from a novel technological tool into a standard and justifiable component of digital business process architectures.

Taken together, this review contributes to clarifying the current state of knowledge, identifying critical yet underexplored areas, and proposing a clear research agenda aimed at advancing more rigorous and comparable evaluations of the business impact of the metaverse. These findings provide a foundation for strategic decision-making and offer guidance for future studies seeking to develop a more robust and actionable understanding of the value generated by immersive technologies.

8. Data Availability Statement

The data supporting the findings of this scoping review consist of the bibliographic and content information extracted from the scientific studies included in the review, all of which are duly cited in the References section. The dataset generated during the study selection and synthesis process (including the list of included and excluded studies and the data extraction matrix) is available from the corresponding author upon reasonable request.

9. Author Contributions

- *Author 1:* Conceptualisation, Methodology, Formal Investigation, Data Curation, Analysis, Writing – Original Draft Preparation, and Visualisation.
- *Author 2:* Validation, Formal Investigation, Analysis, Writing – Review and Editing, and Corresponding Author.
- *Author 3:* Validation, Formal Investigation, Analysis, and Writing – Review and Editing.

Note. This study has been carried out within the framework of the Doctoral Thesis that studies the impact of the Metaverse as a tool for the improvement of business processes within the industrial environment.

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