

Two Decades of Causal Layered Analysis: A Bibliometric Analysis and Review (2000–2022)

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Abstract

Purpose: This study aims to analyze 292 peer-reviewed articles and conference papers on Causal Layered Analysis (CLA) published from 2000 to 2022. The paper delves into the scientific studies conducted over the past two decades regarding CLA. **Design/Methodology/Approach:** This bibliometric analysis offers a comprehensive overview of CLA research, covering trends, topics, influential authors, sources, universities, and journals. It highlights notable figures, such as Sohail Inayatullah and Ivana Milojević, recognizing their influence. The study also identifies the widespread utilization of CLA in futures studies (FS) and metaphor analysis. **Biblioshiny, Excel, and Zotero** were employed for analysis and mapping. **Results:** The findings reveal an increasing publication trend, while the number of citations has experienced a significant decline. Australia, the USA, Iran, Finland, and Taiwan are the top five countries with the most publications. Similarly, Sohail Inayatullah has the most publications and citations at the top. The Journal of Futures Studies, Futures and Foresight has published the highest number of CLA articles, while Foresight by Emerald has the most citations. In terms of author collaboration, the Single-authored studies outnumber co-authored studies. **Originality/Value:** Over the past decade, research on CLA has proliferated due to increased interest in futures studies and critical methods factors. The analysis also indicates constraints in data collection and biases in inclusion criteria, underscoring the necessity for future research to address these issues. This study furnishes a comprehensive overview of CLA research, enhancing understanding of the method and its implications for academic and practical applications.

Keywords

casual layered analysis, futures studies, bibliometric analysis, futures studies methods, science map, causal Layered Analysis research trends

Introduction

The future remains uncertain, neither predictable nor predetermined; because of its external influences, it can either be affected or effective (Sardar 2010). We have encountered one of the deadliest pandemics in history and are

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simultaneously experiencing exponential technological advancement (Buheji and Ahmed 2020). Moreover, the world is witnessing climate change consequences and environmental degradation (Granjou, Walker, and Salazar 2017), international tensions between governments, global inequality, political instability, nuclear proliferation, food insecurity and cybersecurity threats (S. Inayatullah 2013). Futures Studies (FS) provides a theoretical and practical framework that lit the rays of hope by presenting and identifying alternative images to these societal challenges (Slaughter 2001).

Futures Studies is a systematic study of examining the past (collecting data, information, scenarios, stories, and other historical perspectives) and present (current systems and practices) to propose alternative futures (S. Inayatullah 2013), and, as Inayatullah argues, the worldviews and myths that underlie them (Milojević and Inayatullah 2015). The litany of future predictions has its roots in systemic causes, as it maintains a complex relationship with worldviews and myths that align with a more profound cultural metaphor. This complexity renders future predictions impossible (S. Inayatullah 1998). In other words, it is a complex mixture of possible scenarios whose likelihood depends on our present actions (S. Inayatullah 2004). Futures studies uses a wide range of qualitative, quantitative and mixed methods for mapping, anticipative, transformative and alternative futures, including backcasting, scenario and trend analysis, emerging issues analysis, the futures triangle, the futures wheel, and Causal Layered Analysis (CLA) (S. Inayatullah 2013).

Causal Layered Analysis is a transformative method that uses a layered approach by deconstructing and reconstructing complex social problems. The four layers of CLA are litany (functional problems), systematic causes (structural and contextual problems), worldview (discursive problems), and myth/metaphor (metaphoric problems) (S. Inayatullah et al. 2022). It is the only future research method focusing on transformation rather than prediction. Causal Layered Analysis is discussed in detail in next section.

There are numerous literature reviews and analyses are available on the various features of FS (Fergnani 2019), used bibliometric analysis to identify clusters (Dayé 2023), performed citation analysis of the FS publications. There is a vast literature gap between qualitative and quantitative studies to analyze the impact of methods within the FS discipline. Therefore, this study provides a comprehensive bibliometric analysis of the CLA, relying on the existing peer-reviewed literature. Because to the best of the author's knowledge, no prior research has been conducted on the emergence of CLA despite its widespread applications.

Bibliometric analysis is a tool for measuring international scientific activities in general. On the other hand, scientific mapping has been widely accepted in a short time as a newly developing field. Scientific mapping analysis facilitates information access; it is a method that evaluates its structure and change (Ellegaard and Wallin 2015).

Usually, bibliometric analyses are conducted using major scholarly databases such as Scopus, Web of Science (WoS) and PubMed due to their rich indexation containing all metadata metrics relevant to the analysis (Donthu et al. 2021). This study's data collection encompasses almost all scholarly databases, as these databases do not index most journals except Google Scholar. Hence, bibliometric analysis based on results from all databases has been employed to gain detailed insights and identify the current scientific progression and the status of publications items about CLA. The primary objective of this bibliometric analysis, performed on the scientific output of peer-reviewed and conference articles published in various journals and conferences, is to answer the following questions.

- (i) What are the available scientific studies published during 2000–2022 using CLA?
- (ii) What are the current research trends and topics in CLA?
- (iii) Who are the most influential authors, sources, universities, and journals in CLA research?

- (iv) What are the areas where CLA has been applied?

This paper is organized into six sections: Section 1 introduces the work; Section 2 describes the CLA; Section 3 contains the methodology used and the data gathering outlined; Section 4 illustrates the results of the bibliometric analysis; and finally, Section 6 entails the discussion of the results along with conclusions.

Casual Layered Analysis

Causal Layered Analysis (S. Inayatullah 1998) is a qualitative and analytical method for post-structural transformation method, invented by Sohail Inayatullah in the early 1990s (S. Inayatullah et al. 2022). It uses a non-linear approach, which incorporates theoretical and critical perspectives. Employing a layered approach that integrates various theories, CLA was officially published in 1998, although Inayatullah had already applied it extensively in workshops, training sessions, and academic settings earlier (S. Inayatullah 2004; Wildman and Inayatullah 1996). The four interconnected

layers of CLA consist of litany, social causes, discourse/worldview, and myth/metaphor. These layers are used to deconstruct complex social issues and transform them by constructing alternative futures. Inayatullah's CLA is designed on the insights of intellectual giants, with each layer embodying the essence of a substantial theorist. Figure 1 shows the intellectual structure of CLA. The first layer of litany, for instance, is founded on the ideas of Richard Slaughter, while the second layer, social causes, draws inspiration from Galtung's work on peace theory in terms of direct violence, structural and epistemological violence, which is known as analysis of imperialism (centre/periphery theory). The worldview layer is derived from Michael Foucault's historical episteme, and the myth/metaphor layer is influenced by the metho-poetic concept of William Irvin Thompson and John Galtung's renowned CTM theory. In the words of Jim Dator, CLA is hailed as "the first significant new futures theory and method since Delphi" (J. M. Ramos 2015).

Causal Layered Analysis is a methodology formulated within the discipline of FS and has gained significant attention from scholars

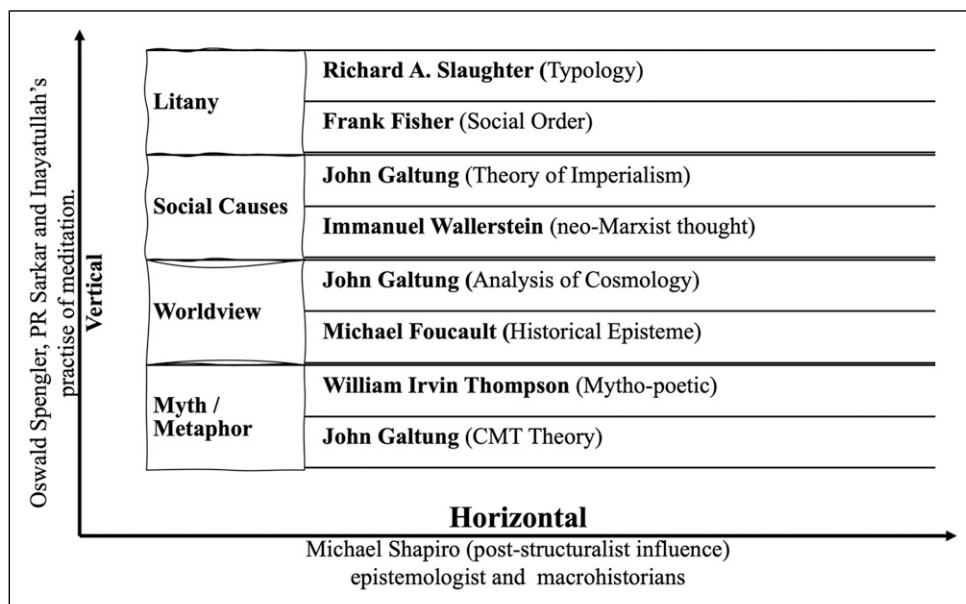


Figure 1. Intellectual structure of CLA (Author's own work).

across various fields in recent years. Currently, CLA has been applied in more than fifty (50) areas, including but not limited to Advocacy (Dorozenko, Roberts, and Bishop 2015), Agricultural Sustainability (Bourgeois 2015), Aviation (May and Hill 2002), Bioethics (Tumbull 2000), Business Ecosystem (Ketonen-Oksi 2018), Business Marketing and Branding (Kotsi et al. 2018), Community Development Accountability (Holdaway 2018), Cultural – Americanization in Korean Culture (Park 2009), Demography – ageing in Singapore (Wong 2013), Aborigines (P. Wildman 2002), Design for Complex societal issues (Jones and Boves 2017), Development – Renewable Energy (Heinonen et al. 2017), Economy – Global Financials (S. Inayatullah 2010), Education – Policy and Reform in Vietnamese Education System (Thanh 2010), Suitability in Higher Education (Nasruddin, Bustami, and Inayatullah 2012) (S. T. Inayatullah et al. 2013), E-learning (Heilesen and Josephsen 2008), Emerging Issues and Weak Signals (Carbonell, Sánchez-Esguevillas, and Carro 2015), Energy – Renewable Energy (Ghouchani et al. 2021), Environmental and Climate Change - Water Management (Absar 2013; Uren, Dzidic, and Bishop 2015), Coastal Governance (Hofmeester et al. 2012), Forestry (Ariell 2010), Mining and minerals (Lederwasch et al. 2011), Financials - Informal Value Transfer Systems (IVTS) Hawala Hundi (Sheraz and Farooqi 2014) Islamic Banking (N. El-Ghattis 2015; El-Ghattis 2016), Gender – Ecofeminism (Hurley 2008), Genetics Engineering (Fricker 2002), Governance – South Korea Alternative Futures (Son 2013), Participatory Governance (Osborne, Mayo, and Bussey 2021), Complex Societal Challenges (Spies 2011), Health – Occupational Therapy (Robinson, Kennedy, and Hamon 2011), IoT in Health Sector (Gomes and Moqaddemerad 2016), Health Policy (Vallis and Inayatullah 2016), Human Thought's Evaluation (Botta 2019), International Relations (Anthony 2010; Hoffman 2012; Wahi 2013), Knowledge Management (S. Inayatullah 2015b), Labor and Workers (Lieto 2015; Morrow 2007), Leadership (Burke 2021), Metaphors (Carbonell, Sánchez-Esguevillas, and Carro 2016), Media – Forward

Theater (Head 2012), Neuroscience (Dunagan 2004, 2010), Ontologies (Poli 2011), Organizational Structure (S. Inayatullah 2005), Sociology – Complex Social Issues (Bishop and Dzidic 2014), Software Engineering (Ferraz et al. 2011), Spirituality and Religious (Kang 2009; Riedy 2016), Technology (Díaz-Domínguez 2020; Farrow 2019; Kim, Connerton, and Park 2021), Transportation (May, Tranter, and Warn 2011), Urban Planning (Daffara 2011; Heinonen and Minkkinen 2016), Warfare (Richardson 2016) and Youth (Watson 2009).

Methodology

Period

This analysis has been performed on the documents collected from various journals and conferences during the period 2000–2022 (23 Years). The search terms were executed in October 2023.

Literature Databases Selection

The data collection for this bibliometric analysis encompassed nearly all available databases and publishers, including the Association for Computing Machinery (ACM), Emerald, JStor, Google Scholar, IEEE Explorer, Oxford Journals, PubMed, Sage, ScienceDirect, Scopus, SpringerLink, Taylor & Francis Online (TandFonline), WoS, and Wiley. The predominant source of literature was Google Scholar due to its comprehensive indexing of almost every piece of literature, regardless of academic biases or discrimination. The rationale behind searching through every database stemmed from numerous academic writers and industry professionals having employed Causal Layer Analysis (CLA) and published in peer-reviewed journals and conferences that are not indexed by the most renowned research databases, particularly open research journals.

Keywords, Query Design and Literature Results

The query is one of the most crucial components and is pivotal for the literature search and

selection. Query design is necessary to extract relevant articles; an efficient query saves the researcher's resources. Hence, two queries were executed across all databases: (1) "CLA" and (2) "CLA" AND ("Litany" OR "litanies"). The first query was executed to determine the availability of overall literature, including reports, journals, conferences, and proceedings in all available languages, resulting in 3,905 documents. The rationale behind the second query was to filter out only those articles in which CLA has been applied, yielding 1,152 records. [Table 1](#) depicts the number of publications retrieved using both queries.

Inclusion and Exclusion Criteria

[Table 2](#) shows the inclusion and exclusion criteria for this study. The study encompasses the literature from 2000 to 2022, excluding papers predating 2000 and those postdating 2022. Inclusion criteria are restricted to peer-reviewed publications from journals and conference proceedings, while all other literature that does not meet these criteria has been omitted. The language is confined to English only. Additionally, the study's primary criterion focuses on including works by authors who have employed CLA as one of their

methodologies, whereas papers where CLA is merely referenced or discussed are excluded.

Literature Selection

After applying the inclusion and exclusion criteria, only a total of 292 publications were included in this study. The whole study is based on these documents.

Tools and Software

As discussed in earlier sections, most of the data collection has been in the database, which is quite labour-intensive; from literature searching to synthesis, the following tools and software have been used to conduct this review:

- i. Zotero: An open-source research assistant for collecting, managing, and organizing the literature. This study used Zotero's duplication removal, noting, and auto-metadata features. ([Mueen Ahmed and Dhubaib 2011](#)) The literature was imported into the Zotero library by downloading the RIS (Research Information System) file format, DOI (Digital Object Identifier) and Zotero chrome extension, which directly added the reference to the

Table 1. Publication Retrieved Using Queries.

Database	Number of Publication Retrieved Using Each Query	
	"Causal Layered Analysis"	"Causal Layered Analysis" AND ("Litany" OR "litanies")
ACM	3	1
Emerald	99	44
Google scholar	2,400	859
IEEE explorer	2	0
Oxford journals	4	1
PubMed	8	03
Sage	61	25
ScienceDirect	185	88
Scopus	810	31
SpringerLink	138	49
TandFOonline	55	24
Web of Science	115	18
Wiley	25	9
Total	3,905	1,152

Table 2. Inclusion and Exclusion Criteria.

No.	Criteria Type	Inclusion Criteria	Exclusion Criteria
1	Publication year	≥2000 – ≤ 2022	≤ 2000 –≥ 2022
2	Publications source	Journals and conference proceedings	Publications other than journals and conference proceedings
3	Document Type	Peer-reviewed articles	Reviews, editorials and letters
4	Language	English	Other than English
5	Study design	CLA applied in the study	CLA referenced or discussed

library. Following the importation process, duplication removal was performed; the remaining literature was seamlessly added to Google Sheets for flexible review organization.

- ii. Publish or Perish (PoP) 8.9: Harzing’s Publish or Perish (PoP) is an academic utility software designed for retrieving and analyzing the literature by its direct bibliographic databases search interface. It was used to retrieve documents from Scopus and Web of Science using their freely available Application Programming Interfaces (APIs) for researchers (Harzing 2007).
- iii. Spreadsheets: Google Sheets (Mansor 2012) was used to perform various operations, especially document organization, extraction, summarization, note taking and synthesizing. Meanwhile, Microsoft Excel 365 was used for some of the charts and tables using Pivot Table.
- iv. Bibliometrix 4.4: R language library which is designed explicitly for the bibliometrics analysis; its intuitive web interface “Biblioshiny” tool was used for performing statistical analysis and reporting. Network diagrams and basic statistics were carried out using this scientometric software (Aria and Cuccurullo 2017).

Results

Key Information

Table 3 presents the essential details of the dataset, comprising 292 documents sourced from 96 different origins. The duration of the

Table 3. Key Information.

Description	Results
Timespan	2000:2022
Sources (journals, books, etc)	96
Documents	292
Annual growth rate %	13.1
Document average age	8.72
Average citations per doc	20.90
Document contents	
Author’s keywords (DE)	304
Authors	
Authors	363
Authors of single-authored docs	113
Authors collaboration	
Single-authored docs	181
Co-authors per Doc	1.73
Document types	
Conference paper	19
Journal articles	273

period from 2000 to 2022 spans 23 years. The dataset reveals a yearly growth rate of 31.1 percent over time, indicating promising article growth. The average age of the publications is 8.72 years. The average number of citations per document is 20.90, showcasing a relatively solid scholarly impact. Regarding author statistics, there are 304 author keywords and 363 authors, with 113 single-authored documents. The author keyword per document ratio is notably low, at 1.24 keywords per document.

Regarding author collaboration, 181 single documents are authored by 113 individuals, with an average co-authorship per document of 1.73. The dataset is categorized into two main types: Journal Articles and Conference Papers. Journal articles represent 273 (93.50 percent),

while conferences cover 19 (6.50 percent) of the dataset.

Publication or Document Type Analysis

Based on the inclusion and exclusion criteria, only two types of studies are observed for this study: peer-reviewed journal articles and conference papers. Figure 2 displays the categorical division of the studies. Out of 292 articles, journals cover 93 percent by producing a total of 273 articles, whereas Conference and proceeding cover (7 percent) by producing 19 studies.

Publication Trends

The bar chart in Figure 3 illustrates the yearly publication count of articles from 2000 to 2022, depicting a rapid increase with an exponential trendline that surpasses its expected growth rate. Causal Layered Analysis received minimal attention in its early years. From 2000 to 2012, only 95 articles were published. However, in the subsequent decade, the number of

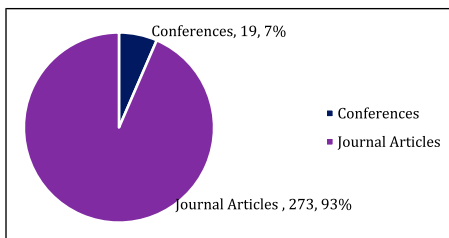


Figure 2. Documents division by types.

publications doubled compared to the previous period, reaching a total of 187 articles. Starting with just two articles in 2002 and steadily increasing, CLA achieved 30 publications in 2022, demonstrating an average annual growth rate of 12.69 publications. The method gained notable popularity in 2008, marked by the publication of 10 articles.

Citation Statistics. Figure 4 displays the year-wise citations. There have been 6,105 citations for the 292 publications thus far. The year 2008 has the highest number of citations, followed by 2003 with 503 citations. The spikes in citations for both years are attributed to (Voros 2003) in 2003 and (S. Inayatullah 2008; Slaughter 2008) in 2008. The number of citations has significantly decreased and continues to do so. Possible reasons for this decline include: (1) It may take more than a few years to accurately reflect the number of citations for recently published research articles. Typically, a clearer picture of the overall citation count may emerge a few years after publication. (2) The recent COVID-19 pandemic has impacted academic and industrial sectors across the board, creating disruptions for research publications and affecting schools, businesses, and other sectors worldwide.

Like year-wise citation analysis, author citation analysis is a very intuitive metric for determining and getting an insight into the author's influence. The author with a high number of citations has great acceptance, recognition, influence, and significance in the academic community. On the contrary, the

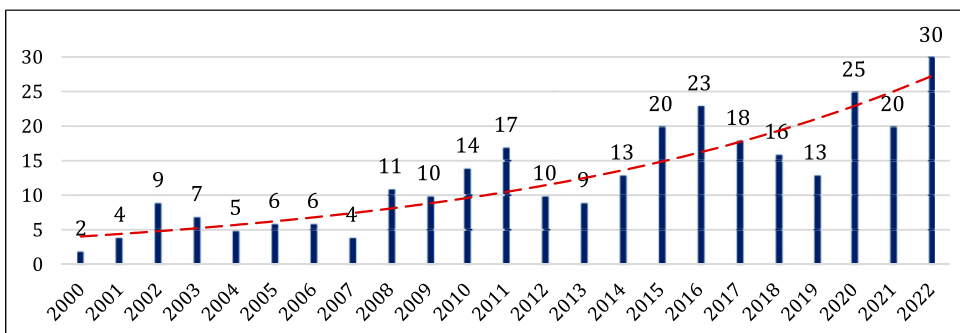


Figure 3. Year-wise publication and trends in CLA research.

author with more publications determines the scholarly contribution of the author for a particular discipline. However, for trustworthiness, an analysis for both metrics is essential.

Most Cited Publications

Table 4 illustrates the most cited studies conducted using CLA. Inayatullah’s “Six Pillars: Futures Thinking for Transforming”

(S. Inayatullah 2008) is at the top with 800 citations. The study introduces a novel approach to the field of FS, utilizing CLA as one of its six fundamental pillars. With 774 citations, “A Generic Foresight Framework” (Voros 2003) by Joseph Voros (Voros, 2003) ranks second. The research aims to provide a new framework to comprehend the underlying principles, assess the foresight process, and establish a novel approach for future studies.

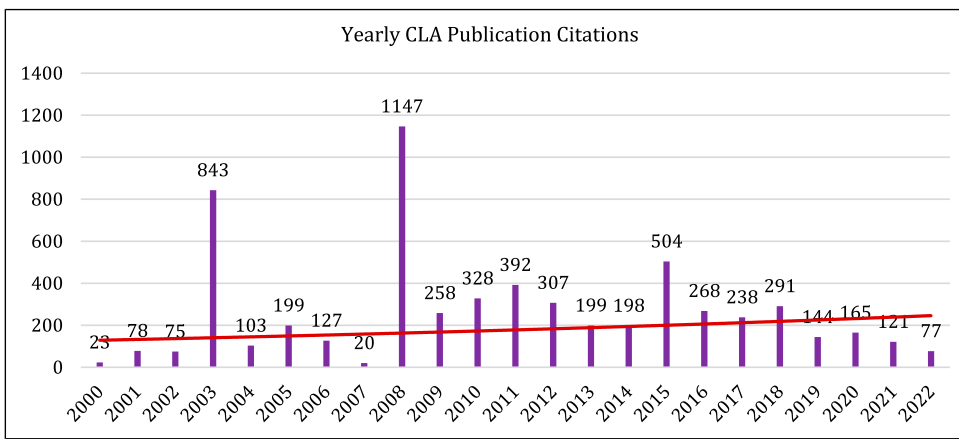


Figure 4. Yearly CLA citations.

Table 4. Most Cited Publications.

S#	Publication Title	Year	Corresponding Author	Source Title	No. of Citations
1	Six pillars: Futures thinking for transforming	2008	Sohail Inayatullah	Foresight	800
2	A generic foresight process framework	2003	Joseph Voros	Foresight	774
3	Narrative foresight	2015	Ivana Milojević	Futures	203
4	Implementing a student-centered learning approach at Vietnamese higher education institutions: Barriers under layers of causal layered analysis (CLA)	2010	Pham Thi Hong Thanh	Journal of futures studies	168
5	Steps toward an explicit ontology of the future	2011	Roberto Poli	Journal of futures studies	127
6	Roads less traveled: Different methods, different futures	2009	Andrew Curry	Journal of futures studies	126
7	What difference does ‘integral make?	2008	Richard A. Slaughter	Futures	122
8	Transformative foresight: Universiti Sains Malaysia leads the way	2012	Elisha Nasruddin	Futures	100

The article “*Narrative Foresight*” (Milojević and Inayatullah 2015) by Dr Ivana and Sohail Inayatullah is ranked third with 203 citations. The article highlights the importance of creating personal narratives to construct scenarios through CLA. The publication “*Implementing a student-centered learning approach at Vietnamese higher education institutions: barriers under Layers of CLA*” (Thanh 2010) by Pham Thi Hong Thanh (2010) is in the fourth position, referenced in 168 documents. The study examined traditional teaching approaches and the future implications of student-centered approaches in higher education in Vietnam. The publication “*Steps Toward an Explicit Ontology of the Future*” (Poli 2011) by Robert Poli stands at number five with 127 citations; the study aims to provide a basic understanding of the theories of latent and levels of reality. Positioned sixth, Andrew Curry’s “*Roads less traveled: different methods, different futures*” (Curry and Schultz 2009), with 126 citations, focuses on evaluating different scenario outcomes based on different methods, including the 2×2 matrix approach, CLA, Manoa approach, and Scenario archetypes approach. The literature ranked seventh, “*What difference does ‘integral make?’*” by Richard A. Slaughter (Slaughter 2008), is a critical review of CLA from an integral point of view and explores his personal views on the limitations of CLA and how an integral approach can address them. The most cited eighth study, “*Transformative Foresight: Universiti Sains Malaysia leads the way*” (Nasruddin, Bustami, and Inayatullah 2012), has 100 citations by Elisha Nasruddin; the study was

conducted using Inayatullah’s Six Pillars methodology to explore the alternative futures of higher education in Malaysia.

Authors Analysis

The Author analysis is carried out on all the documents, including co-authors; the co-authored work is counted as equal to the corresponding author. Figure 5 and Table 5 show the top authors with the most publications, with a minimum threshold of five publications each. With 22 contributions, the creator of the CLA Method, “Prof. Sohail Inayatullah,” is on top of the stack. Marcus Bussey, who has eleven publications, is second after Sohail Inayatullah. Third place goes to Marcus Anthony, who has eight contributions. With six publications, Dr Ivana Milojević and Sirkka Heinonen stand in fifth position. Patricia Kelly and Colin Russo are ranked sixth with two studies each.

The authors with the most citations differ from those who have published the most, as shown in Table 6 and Figure 6. The citation analysis reveals notable variations in the scholarly impact of different authors within the field. Sohail Inayatullah has garnered a substantial number of citations, getting a total of 1,451 citations across 22 publications, yielding an average of 65.95 citations per document. Despite his limited publication count of only three, Joseph Voros demonstrates a remarkably high average of 304.33 citations per document, highlighting the significant impact of his work. Ivana Milojević’s work is cited in 296 articles.

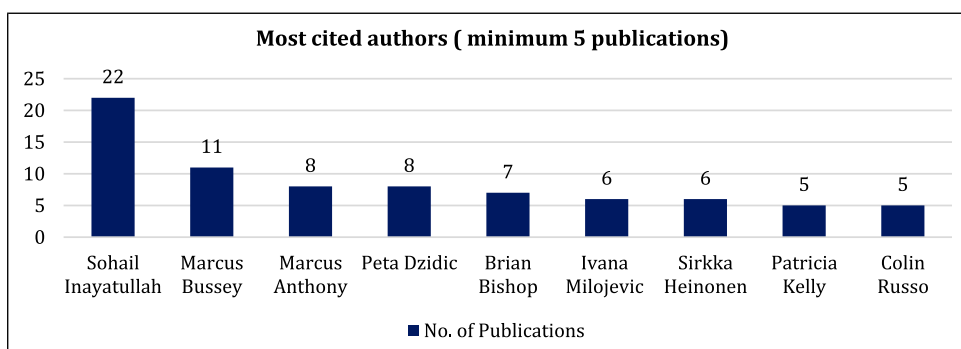


Figure 5. Top Authors with Minimum five publications.

Richard A. Slaughter's two publications have 193 citations. In contrast, despite their extensive publication records, Marcus Bussey and Marcus Anthony exhibit comparatively lower average citation rates, with 11.82 and 13.13 citations per document, respectively. Roberto Poli's case is intriguing as he has achieved an exceptionally high citation count of 127.00 per document despite having only one publication.

Table 5. Top Authors With Minimum Five Publications.

S. No.	Author Name	No. of Publications	Total Citations
1	Sohail Inayatullah	22	1,451
2	Marcus Bussey	11	130
3	Marcus Anthony	8	105
4	Brian Bishop	7	317
5	Peta Dzidic	8	238
6	Ivana Milojević	6	296
7	Sirkka Heinonen	6	109
8	Patricia Kelly	5	41
9	Colin Russo	5	9

Publication Analysis

The publication analysis is used to identify the impact of publications by various means. The analysis comprised in this study is based on the Total number of Publications and number of Citations. There have been 96 publication sources identified, which comprise both journals and conferences. The results presented in [Table 7](#) provide a clear picture of the total number of articles by top ten sources. Amongst all the sources, the Journal of Futures Studies (JFS) by Tamkang University remains at the top by producing 93 papers (31.84 percent). Following the JFS are Futures by Elsevier (50) articles (17.12 percent), Foresight by Emerald (24) studies (8.21 percent), World Futures Review by Sage (16) contributions (5.47 percent), European Journal of Futures Research (5), On the Horizon (5) both (3.42 percent) published by Emerald also the Technological Forecasting and Social Change by Elsevier (3). Subsequently, the American Journal of Community Psychology by Willey, Disability and Society, and International Journal of Lifelong Education, both by Taylor & Francis, are

Table 6. Author With Most Citations (Min. 100).

S.No.	Author	No. of Citations	No. of Publications	Average Citation Per Document
1	Sohail Inayatullah	1,451	22	65.95
2	Joseph Voros	913	3	304.33
3	Brian Bishop	317	7	45.29
4	Ivana Milojević	296	6	49.33
5	Peta Dzidic	238	7	34.00
6	Richard A. Slaughter	193	2	96.50
7	Pham Thi Hong Thanh	190	2	95.00
8	Marcus Bussey	130	11	11.82
9	Roberto Poli	127	1	127.00
10	Andrew Curry	126	1	126.00
11	Wendy L. Schultz	126	1	126.00
12	Chris Riedy	124	3	41.33
13	Hannah V. Uren	114	2	57.00
14	Sirkka Heinonen	109	6	18.17
15	Marcus Anthony	105	8	13.13
16	Peta Dzidic	101	3	33.67
17	Elisha Nasruddin	100	1	100.00
18	Reevany Bustami	100	1	100.00

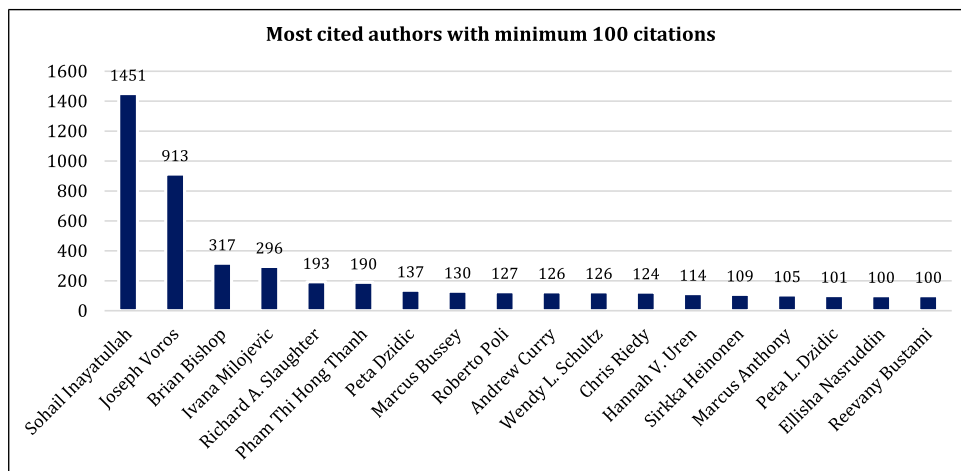


Figure 6. Author with most citations (Min. 100).

positioned at sixth with a contribution of (2) publications, each accumulating (3.08 percent) (Figure 7).

Contribution by Affiliation

Figure 8 and Table 8 display the top ten affiliations or organizations with the highest publication output. A total of 201 different affiliation sources, including institutions, organizations, and independent futurists, have contributed to the production of CLA. Multi-institutional collaborative efforts had a significant global impact in the realm of CLA contributions. The Australian University of the Sunshine Coast leads with 43 research articles among prominent affiliations. Following closely with a significant impact, Tamkang University in Taiwan has 16 publications with 1,338 citations. Curtin University, an Australian institution, has made significant contributions by publishing 12 research papers and accumulating 374 citations, further solidifying the country’s leading position in CLA pursuits. Moreover, MetaFuture School, an educational think-tank in Australia, has achieved significant progress with 11 published works and 318 references, highlighting the wide range of contributors in the academic field. MetaFuture is considered the Home of CLA as it has published a wide range of books on the method.

Table 7. Journals With Most Publications (Most Relevant Source).

S. No.	Source (Journal/Conference)	No. of Titles	No. of Citations
1	Journal of futures studies	93	1,332
2	Futures	50	1,362
3	Foresight	24	1,916
4	World futures review	16	165
5	On the Horizon	5	121
6	European journal of futures research	5	53

Dr Ivana Milojević is the Director of Meta-Future School. The University of Turku in Finland, as well as in Australia: Queensland University of Technology, Swinburne University of Technology, and The University of Queensland, have individually made significant contributions with differing publication and citation counts. In addition, the presence of an Independent Researcher who has published six papers and received 33 citations highlights the worldwide and varied scope of research, surpassing institutional associations. The research approach emphasizes collaboration and multiple perspectives, highlighting the diverse exchange of global knowledge. Australia and Taiwan are particularly notable as essential contributors in this academic context.

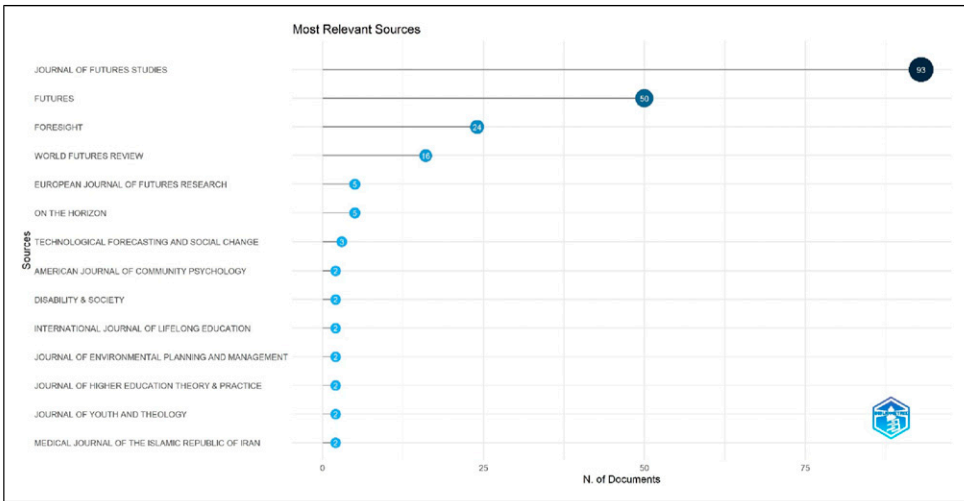


Figure 7. Publications by journal minimum five.

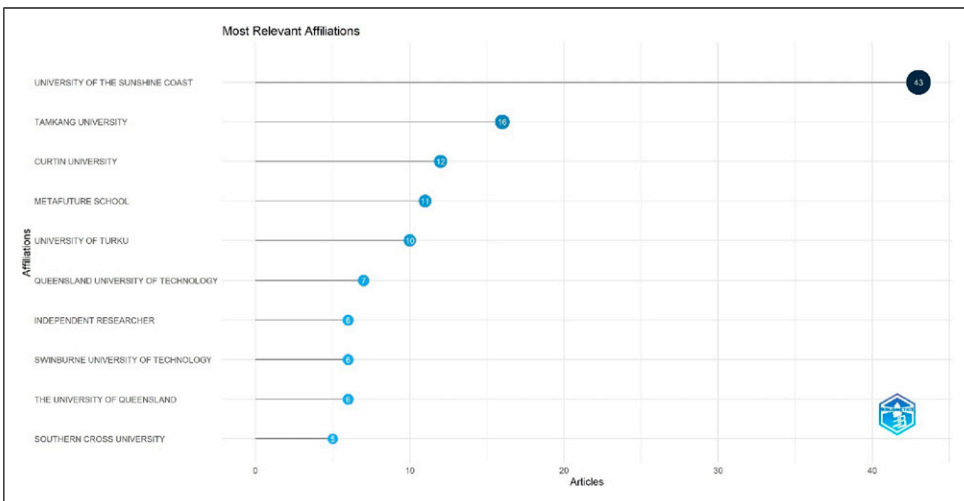


Figure 8. Most publication producer institutions (top ten).

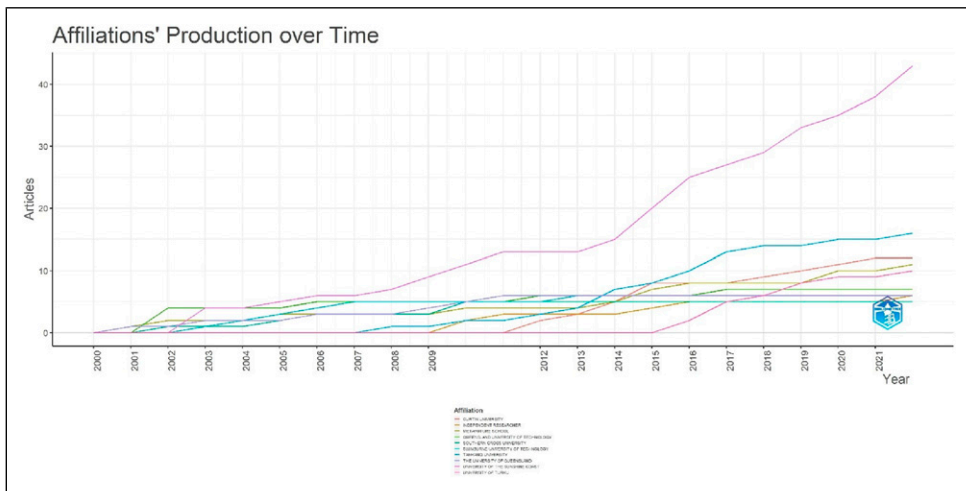
Publications Trendline

Figure 9 and Table 9 depict the trendline spanning 23 years, from 2000 to 2022. The longitudinal analysis conducted by various affiliations illustrates the trendline for CLA production based on author affiliations or institutions. The consistent publication activity since last year propelled the University of the Sunshine Coast to the top, a trend observed since 2005. Tamkang University in Taiwan

entered the CLA publication arena in 2008. Curtin University joined later in 2012 but caught up, concluding with 12 publications. Metafuture School exhibited a unique pattern, steadily increasing from 1 publication to 11 over 23 years. The University of Turku in Finland published its inaugural study related to CLA in 2016, demonstrating consistent growth from 2 to 10 publications. Other institutions, such as the Queensland University of Technology, Swinburne University of Technology,

Table 8. Most Article Producing Institutions (Top Ten).

S. No.	Author Affiliation	Country	No. of Publications	No. of Citations
1	University of the Sunshine Coast	Australia	43	477
2	Tamkang University	Taiwan	16	1,338
3	Curtin University	Australia	12	374
4	MetaFuture School	Australia	11	318
5	University of Turku	Finland	10	217
6	Queensland University of Technology	Australia	7	46
7	Swinburne University of Technology	Australia	6	932
8	The University of Queensland	Australia	6	245
9	Independent researcher	Multiple countries	6	33
10	Southern Cross University	Australia	5	84

**Figure 9.** Institution CLA publications trendline.

The University of Queensland, and Southern Cross University, made noteworthy contributions in different years but have yet to accumulate publications spanning a decade. Independent researchers working autonomously have also made a significant contribution, reaching six publications by the end of the period.

Country-wise Distribution

Figure 10 and Table 10 depict the distribution of papers by country. Australia made the most significant contribution by publishing 140

publications, constituting 48 percent of the articles in this study. CLA was conceived and fostered in the intellectual landscape of Australia, remaining preminent in its scholarly contributions to its inherent method. Following Australia in the top ten, the CLA nations with the highest number of research studies are the United States, Iran, Finland, Taiwan, the United Kingdom, South Africa, China, New Zealand, and Pakistan. These top ten countries in this study account for approximately 80 percent of total publications. Meanwhile, if all available studies were considered, Iran would have ranked second due to the most publications.

Table 9. Affiliation Production Trendline.

Institution/Affiliation	23 Years (2000–2022)																						
	00	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
University of the Sunshine Coast	-	-	-	4	4	4	5	6	6	7	9	11	13	13	15	20	25	27	29	33	35	38	43
Tamkang University	-	-	-	-	-	-	-	-	1	1	2	2	3	4	7	8	10	13	14	14	15	15	16
Curtin University	-	-	-	-	-	-	-	-	-	-	-	-	2	3	5	8	8	8	9	10	11	12	12
Metafuture School	-	1	2	2	2	3	3	3	3	3	4	4	4	4	5	7	8	8	8	8	10	10	11
University of Turku	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	5	6	8	9	9	10
Queensland University of Technology	-	-	4	4	4	4	5	5	5	5	5	5	6	6	6	6	6	7	-	-	-	-	-
Independent researchers	-	-	-	-	-	-	-	-	-	-	-	2	3	3	3	4	5	5	5	5	5	5	6
Swinburne University of Technology	-	-	-	1	2	3	4	5	5	5	5	5	5	6	-	-	-	-	-	-	-	-	-
The University of Queensland	-	1	1	2	2	2	3	3	3	4	5	6	-	-	-	-	-	-	-	-	-	-	-
Southern Cross University	-	-	1	1	1	2	3	3	3	3	5	-	-	-	-	-	-	-	-	-	-	-	-
Yearly contribution of affiliations	-	2	8	14	15	19	24	25	27	30	39	43	47	50	58	70	81	90	95	102	109	113	122

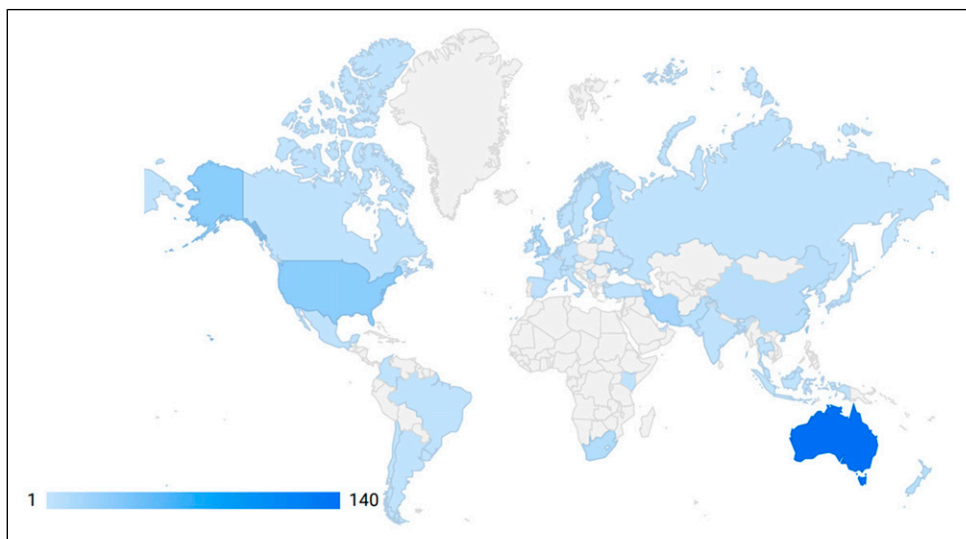


Figure 10. Publications by country.

Table 10. Publications by Country.

Country	Number of Papers
Australia	140
USA	29
Iran	18
Finland	17
Taiwan	15
United Kingdom	12
South Africa	10
China	6
Pakistan	5
New Zealand	5

Table 11. Keywords Summary.

Description	Weightage
Documents with keywords	217
Document without keywords	75
The sum of all keywords	1,211
Distinct keywords	801
Top 5 keywords with occurrence	Causal layered analysis (89), scenarios (24), CLA (21), futures studies (18), Metaphor (12)

Keyword Analysis

This keyword analysis is based on Author Keywords. A total of 217 studies were associated with keywords, while 75 had no associated keywords; a total of 1,211 keywords were discovered, with 801 being distinct. Table 11 contains the keyword summary. The most frequent keywords “CLA”, “Scenarios”, “CLA”, “FS”, Metaphor”, CLA”, “futures”, “foresight”, “futures thinking”, “Sustainability”, “Metaphors”, “Alternative Futures”, “Policy”, “Higher education”, transformation”, “Worldview”, “Narrative foresight” and

“futures literacy” are with more than 5 times occurrence.

This analysis focuses on the co-occurrence of the author’s keywords. Figure 11 shows the author’s keyword co-occurrence network diagram. The minimum number of occurrences was set to 2, with 100 nodes in the initial network layout. Out of the total of 801 keywords, only 53 meet the baseline criteria. These 54 keywords were further categorized into 10 clusters. The rationale behind setting the occurrences to two is that publications carried out using CLA in various fields could be more extensive. This study employs a manual

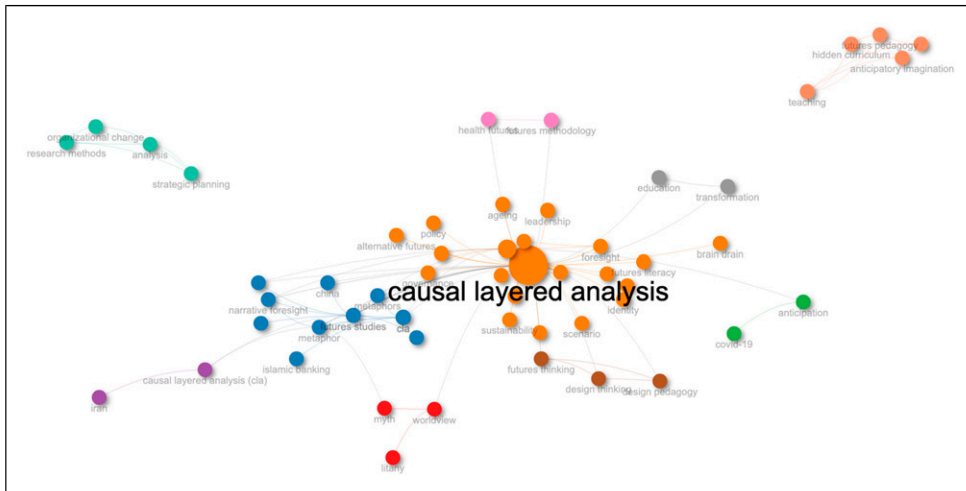


Figure 11. Author keywords Co-occurrence network diagram.

process; hence, a multilevel cleaning process has been conducted to ensure the quality of the results. The keyword normalization process was applied using the association method. The larger nodes in the co-occurrence analysis highlight the most frequently applied keywords in the literature. The keyword “CLA” (orange) has the highest number of occurrences and is most associated with nodes.

The first cluster in orange color consists of 21 nodes containing aging, alternative futures, artificial intelligence, brain drain, CLA, democracy, foresight, futures, futures literacy, futures triangle, governance, higher education, identity, leadership, policy, scenario, scenario planning, scenarios, sustainability, Taiwan, and worldviews. The next cluster in blue has a network of 10 nodes, including keywords China, CLA, community engagement, future, FS, Islamic banking, metaphor, metaphors, narrative foresight, and visioning. The third cluster, with a light orange color, comprises five nodes with keywords anticipatory imagination, futures pedagogy, futures senses, hidden curriculum, and teaching. The cluster in light green has four nodes containing keywords analysis, organizational change, research methods, and strategic planning. Another cluster with red and purple colors comprises three nodes: myth, worldview, litany, design

pedagogy, design thinking, and futures thinking. Finally, three clusters have only two nodes each: futures methodology and health futures (pink), education and transformation (grey), CLA and Iran (maroon), and anticipation, COVID-19 (green).

Author Collaboration Analysis

The analysis of author collaboration networks or social network analysis reveals the degree of relationships among various scholars collaborating on publications in a specific area of study. This technique is also employed to uncover the prominence of authors. Figure 12 illustrates the number of authors for a particular study. Out of 182 studies, 62.32 percent were single-authored, while 110 (37.62 percent) documents were multi-authored. This suggests minimal collaboration among CLA authors. A high level of collaboration was observed in only three documents with six authors.

At the author level, degree centrality measures the number of partners with whom a researcher has co-authored articles (Yan and Ding 2009). Found that researchers with a higher number of collaborators in a scientific community are likely to have a greater influence within the community and facilitate a

more efficient exchange of information. Essentially, a scholar's popularity and communication activity in the co-authorship network are measured by their degree of centrality.

Figure 13 illustrates the author's collaborations. The network exhibits five distinct clusters comprising 18 authors who have engaged in collaborative research endeavors with one another. Clusters with larger diameters indicate the highest level of proximity between writers in terms of cooperation. Similarly, writers who are separated within the same cluster indicate a lower level of intimacy and cooperation. These investigations are mostly

independent research conducted by individual writers.

CLA as a Tool of Trade for Futurists

There is a wide range of applications for CLA where it has been applied. Due to its flexible nature during execution, the scope of CLA is expanding to encompass not only the exploration and transformation of futures but also the development and evaluation of novel methods, tools, and approaches. Table 12 contains some

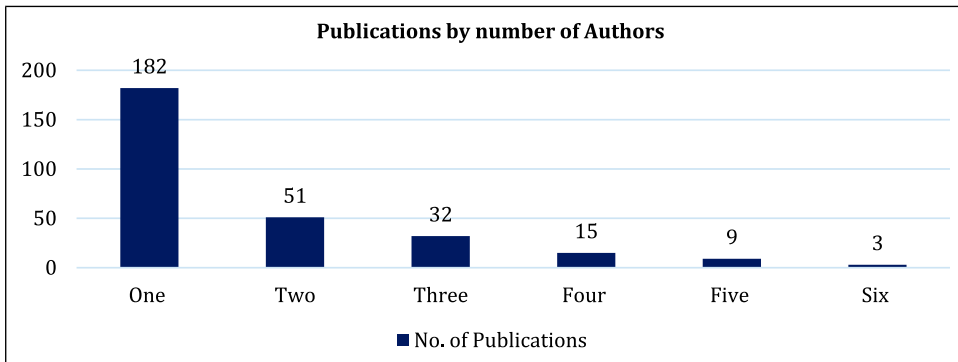


Figure 12. Publication by number of Authors.

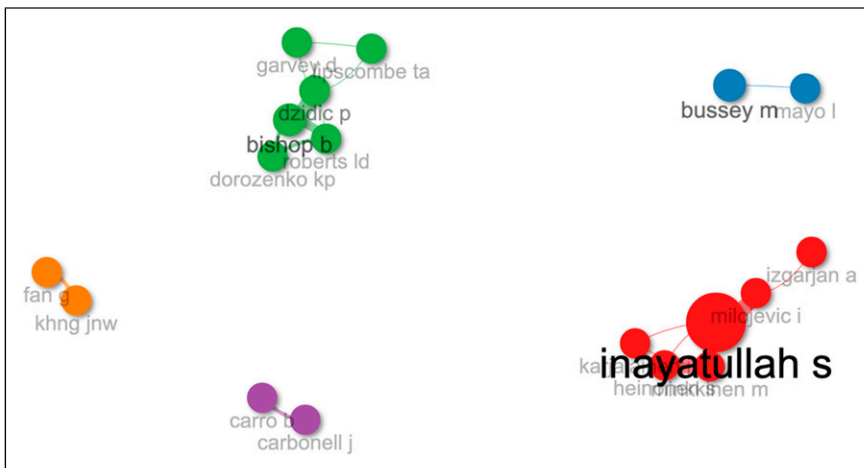


Figure 13. Author collaboration network.

Table 12. Approaches and Frameworks Designed Using CLA.

Approaches	Six Pillar (S. Inayatullah 2008), Smart health (Gomes and Moqaddemerad 2016), transformative Learning for Climate Change (Hampson and Rich-Tolsma 2011), Causal Layered Pedagogy (CLP) (Bussey 2009), Anticipatory Innovation (J. Ramos 2004).
Frameworks	Generic foresight process (Voros 2003), place Branding (Kotsi et al. 2018), Mode-level analysis (Voros 2006), generalized layered methodology (Voros 2005), visualization method for mapping large-scale systems (Jones and Bowes 2017), Integrative and broad-based framework social mediation (Edwards 2008), policy narrative framework analysis (POLiFRAME) (Miedziński 2018), future behaviour of complex socio-economic systems (Biglari et al. 2022), decision support framework for reusability of industrial water (Piadeh, Ahmadi, and Behzadian 2022), Vatern health services (Palmer and Ellis 2009) and narrative foresight (Milojević and Inayatullah 2015).
Evaluation	Industrial design LFD framework (Berkan, Er, and Jonas 2017), neo-collectivist consciousness HEM (Botta 2019), Tazkiah Banks (N. El-Ghattis 2015).

of the approaches and frameworks created using CLA, including the evaluation of methods carried out using a similar approach.

Conclusion

This study aimed to conduct a bibliometric analysis to present the current status of research on CLA literature published in peer-reviewed journals and conferences. This review offers a transparent and comprehensible model based on literature collected from 2000 to 2022. Data was gathered using multiple databases and sources, resulting in an initial total of 3,905 publications. After screening 1152 papers and applying inclusion and exclusion criteria, 292 articles were selected for this bibliometric study. Among these 292 studies, a substantial portion is covered by journal articles. The analysis utilized Zotero, Publish or Perish, Excel, and the R language-based Bibliometrix software.

The publication trend in CLA has shown an increase since 2008, with the current growth rate at 13.1 percent per document per year. Production in 2015, 2020, and 2022 was significantly higher compared to other years. Conversely, the citation trend has been relatively declining since 2018. Regarding document citation analysis, only eight studies had more than 100 citations each. Out of all the authors, only nine have met the minimal publishing requirement at least five times. The top three authors in terms of publications are

Sohail Inayatullah, Marcus Bussey, and Marcus Anthony.

Concerning writers with a higher number of citations, 18 authors have reached the minimum criterion of 100 citations. The Journal of FS has the most significant number of publications, with a total of 93 publications.

On the other hand, Foresight has the highest number of citations, totaling 1916. With 43 papers, the University of the Sunshine Coast in Australia continues to be the top affiliate in terms of university publishing contribution among the top ten. It is worth mentioning here that Sohail Inayatullah was an adjunct professor there from 2002 to 2020. The MetaFuture School in Australia holds the record for the most extended publication period, spanning 22 years. The three institutions in the top 10 have yet to contribute since 2014. In terms of country production, Australia has generated 143 papers out of a total of 292 publications. The top 5 keywords are CLA, Scenarios, CLA, FS, and Metaphor.

Out of the 217 publications analyzed, 1217 author keywords were identified, with 801 of them being distinct. The keyword co-occurrence network diagram consists of 54 keywords organized into 10 clusters. Nevertheless, the level of collaboration among the authors is limited, as only 182 articles are authored by a single individual. A publication can have a maximum of six authors. The network diagram has identified only five distinct groups.

The possible hypothesis for the popularity of the CLA could be that, prior to its introduction to the world, it had already been implemented and embraced in various systems by many organizations for different applications (S. Inayatullah 2004). Another reason for the surge in the popularity of the CLA is the consistent publication of books by industry and academia experts. These books contain technical information and case studies related to the CLA; notable among them are *The CLA Reader, CLA 2.0* (S. Inayatullah and Milojevic 2015), *What Works* (S. Inayatullah 2015a), *CLA 3.0 Thirty Years of Transformative research* (S. Inayatullah et al. 2022). The case studies come from CLA champions who are affiliated with world-famous organizations such as the United Nations, World Bank, World Health Organization, Interpol, and UNESCO. Additionally, CLA has become a part of the FS curriculum for certification and degree-level programs. Over the past 20 years, thousands of senior managers have been introduced to it through schools like the Melbourne Business School, Stellenbosch University, University of Houston, and Turku School of Economics (TSE) at the University of Turku.

Moreover, CLA integrates with every FS method, encompassing critical, empirical, interpretive, and action-learning approaches. In addition to aligning with these methods, it also facilitates the creation, evaluation, and validation of the methods. Finally, it is the only method that employs a transformative rather than predictive approach.

The study holds promising practical implications. The first objective is to conduct research on the direction of future studies by identifying prevailing trends and topics in the field of CLA. Second, it provides valuable insights to researchers, enabling them to identify areas that require further exploration. Furthermore, perspectives derived from influential authors, reputable journals, and institutions can offer policy and decision-makers a comprehensive body of knowledge. Also, it provides an extensive overview of the various application areas of CLA, serving as a wide-ranging professional reference for Foresight.

In addition to the above, this analysis also has theoretical implications. The analysis enriches CLA applications by enhancing knowledge by summarizing the literature and identifying theoretical gaps. Similarly, it provides methodological insight by applying various qualitative analyses to the literature. Third, it opens the gates to CLA research collaboration by identifying the most influential authors, sources, and countries.

In conclusion, the CLA uncovers the complexities by digging deeper beyond surface-level observations, exploring systemic structures, questioning underlying worldviews, and unfolding the metaphorical narratives that influence our perception of change. Our world, characterized by interconnected systems and unpredictable events, demands tools like CLA to navigate these intricacies and uncover deeper causalities. Causal Layered Analysis provides an opportunity to explore complex issues from various perspectives with a comprehensive understanding and multi-dimensional visions. It also offers a prime way to communicate complex ideas through storytelling, performance, engaging audiences and exploring underlying beliefs and metaphors. The four layers of causation, from litany to metaphorical understanding with mythical exploration, delve into deeper layers of causation. Its interdisciplinary approach makes it a valuable tool for understanding and addressing complex challenges.

CLA plays a prominent role in the research landscape of future studies and is relatively increasing. Hence, this bibliometric analysis provides insight into CLA by exploring the rising and expanding dimensions. The friendly execution of CLA, from the visible (litany) to the invisible (myths/metaphors), for understanding and transforming the futures, makes it one of the highly evolving methods explored in this study. This opens the gates for FS researchers to explore other perspectives related to the methodology.

Based on the data, CLA has gone from an experimental methodology to one of the most significant methods in the futures field or using level 4, it has gone from a plant to a forest of deep foresight.

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