

# The Transformation of the Concept of Competitive Intelligence in the Digital Age

Ricardo Reckziegel

Administração, UNIVALI

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## SUMMARY

Competitive intelligence (CI) has evolved from a practice based on manual data collection to a strategic asset guided by the analysis of large volumes of information. This study investigates this conceptual evolution between 1985 and 2021, based on a bibliometric review based on the PRISMA protocol and analysis with the Bibliometrix package in R, applied to 2,519 articles extracted from the Scopus database. The results reveal three distinct phases: (i) operational – focusing on competitor surveillance and structured data collection; (ii) organizational – institutionalizing CI, with systematic processes and support for strategic management; and (iii) digital – adopting Big Data, AI, and automation, reflecting new technological paradigms. These findings reinforce the transition of CI from a reactive practice to a proactive competency, integrated with Business Intelligence and analytics systems. The study systematizes this trajectory, highlighting persistent challenges such as a shortage of professionals, data governance, and limited application in SMEs and emerging economies. It also points to avenues for future research focused on ethical implementation, technological developments, and diverse organizational contexts.

**Keywords:** Competitive Intelligence, Concept, Evolution, Bibliometrics, Theoretical Review

## INTRODUCTION

Competitive Intelligence (CI) has emerged as a core discipline for organizations seeking superior performance in environments characterized by high volatility, information velocity, and strategic complexity. From its roots in Military Intelligence, with references dating back to Sun Tzu, to its development in business strategy theory, the concept of CI has continually evolved, reflecting shifts in organizational demands and available technologies.

In the 1970s and 1980s, CI was addressed by management theorists focusing on data collection, competitor surveillance, and reactive market analysis. Michael Porter (1980) catalyzed the institutionalization of CI, highlighting competitive analysis as a key element of strategy. During this period, authors such as Prescott & Miller (1995) and Gilad (1994) also developed conceptual frameworks that defined CI as "information analyzed for strategic purposes."

The transition to the 2000s was marked by the recognition of CI as a formal organizational function, incorporating quantitative methods, benchmarking, technology surveillance, and environmental analysis. Fleisher and Bensoussan (2002) emphasize the professionalization of this practice, integrated into companies' systematic decision-making processes. At the same time, national studies have highlighted differences between private and public companies, as well as gaps in the practice's maturity.

From 2010 to the present day, CI has become a strategic digital asset, driven by Big Data, AI, predictive analytics, and automation in data collection and interpretation processes. Cheng & Chen (2022) analyze this phenomenon from a bibliometric perspective, highlighting the transition from classic themes to intelligent technologies. Hiremath (2025) reinforces this movement by highlighting the use of real-time analytics and integration with *business intelligence*.

These three periods—operational (1970-90 -), organizational (2000-10), and digital (2011-25) —reflect profound structural changes in the way CI is perceived and applied. Longitudinal studies, such as that by

Camargo (2018), have mapped more than 6,000 publications in Scopus and WoS between 1958 and -2016, demonstrating the growth and maturity of the topic.

This article aims to answer the following questions:

1. How has the concept of CI evolved over five decades of academic and practical development?
2. Who are the main authors, trends and publications that have driven this evolution?
3. How have the latest digital technologies and organizational paradigms redefined the scope of CI?

To conduct the analysis, we applied a structured bibliometric review using the PRISMA protocol, ensuring transparency in study selection, and used the Bibliometrix package in R to perform quantitative analysis, citation networks, term co-occurrence, and production over time. Our approach follows the guidelines of studies such as Büyükkıdık (2022), which used PRISMA combined with Bibliometrix to examine thousands of articles in databases such as Web of Science and Scopus. The objective is to provide an up-to-date and robust overview of the conceptual evolution of scientific research between 1980 and 2025, contributing to both academic debate and strategic management.

## THEORETICAL FRAMEWORK

### Origins of the Concept of Competitive Intelligence

The origins of the concept of Competitive Intelligence (CI) are deeply linked to classical theories of business strategy. Michael Porter (1980), by proposing the five competitive forces and industry analysis, laid the foundation for the structured use of external information in the strategic process. Similarly, Prescott (1995) defined CI as the organizational ability to transform disparate data from the external environment into insights that support competitive advantage.

Gilad (1994), in turn, was one of the first authors to differentiate CI from simple information gathering, advocating an analytical and ethical model focused on anticipating market movements. He emphasizes that CI is not industrial espionage, but rather the systematization of open sources to generate actionable intelligence.

### Competitive Intelligence as an Organizational Function

As the concept matured, the 2000s witnessed a repositioning of CI as a strategic organizational function, directly linked to knowledge management processes and information governance. Fleisher and Bensoussan (2002) pioneered frameworks that integrate CI with benchmarking, scenario analysis, innovation management, and technology monitoring.

In this context, CI began to be operationalized by dedicated departments, staffed by specialized professionals and standardized processes. This institutionalization allowed for greater alignment between intelligence and strategic decisions (Lönnqvist & Pirttimäki, 2006). Furthermore, organizations began adopting software and decision support systems, which fostered integration between areas such as marketing, R&D, and strategic planning.

### The Digital Age and Data-Driven CI

Starting in 2010, CI began to heavily incorporate digital technologies. The emergence of Big Data, the Internet of Things (IoT), and Artificial Intelligence (AI) has radically transformed the means of collecting, processing, and analyzing data. According to Cheng & Chen (2022), "Digital Competitive Intelligence" involves the automation of analytical steps, the use of interactive dashboards, and predictive modeling to anticipate market trends.

Hiremath (2025) argues that contemporary CI differs from previous versions due to its scalability and speed, as well as its integration with Business Intelligence and Machine Learning platforms. This evolution allows

companies to act in real time, dynamically adjusting their strategies based on weak signals captured in the digital environment (Debicki, 2020).

Authors such as Calof & Wright (2008) also emphasize the multidisciplinary role of digital CI, pointing out that its success depends on competencies in data science, strategy, organizational behavior, and information ethics. Thus, CI evolves from a tactical process to a core competency in the era of digital transformation.

## METHODOLOGY

This study adopted a mixed-quantitative approach, combining theoretical review with bibliometric analysis to map the conceptual evolution of Competitive Intelligence (CI) between 1985 and 2021 (cut adjustment according to available databases).

### Data Collection and Publication Selection

- Database used: Scopus.
- Search criteria: the exact term "Competitive Intelligence" in title, abstract and keywords.
- Scope document type: Limited to article and open access limited to all.

This criterion resulted in 2,548 articles in the Scopus database.

The PRISMA protocol was followed, adapted for bibliometric review:

1. Identification: 2,548 records in Scopus.
2. Screening: exclusion of duplicates, editorials and non-scientific categories.
3. Eligibility: application of restricted scope criteria to the IC; sample verification by reading abstracts.
4. Inclusion: final corpus of 2,519 documents after exclusion of errors.

### Bibliometric Analysis with Bibliometrix

We used the Bibliometrix package (Aria & Cuccurullo, 2017) in R for quantitative analysis:

1. Data Import:
2. Using `convert2df()` to convert Scopus records to data frame.
3. Descriptive metrics:

Analysis of annual production, main authors, journals, countries, citations, H-indexes, dominance, via `biblioAnalysis()`, `summary()` and `citations()`.

### Networks and Trends:

Network Extraction from:

Co-authorship (authors)

Co-citation (references/authors)

Co-occurrence of terms (keywords)

Use of the `biblioNetwork()` function and visualization via `networkPlot()` and Biblioshiny's interactive interface.

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**Thematic evolution:**

Term extraction by termExtraction () and temporal cluster analysis to identify conceptual phases of CI.

**Reproducibility and transparency:**

The PRISMA protocol was documented in a detailed flowchart, as recommended by Donthu et al. (2021), ensuring process traceability.

**RESULTS AND ANALYSIS****Chronological Evolution of Scientific Production**

A search for "Competitive Intelligence" in title, abstract, or keywords in Scopus (1985–2021) returned 2,548 records, of which 2,519 articles were retained after applying the PRISMA protocol (steps to exclude duplicates, irrelevant document types, and indexing errors). This confirms a broad and consistent basis for analysis.

The annual production graph, processed via Bibliometrix, shows:

- Moderate initial growth (5–10 articles/year) until mid-2000;
- Significant acceleration between 2005–2015 (~80–130 articles/year);
- Plateau post --2015, with ~150 articles/year until 2021.

This evolution corroborates the literature on the expansion of CI, including studies such as Lopes et al. (2017), which identified 3,453 articles up to 2013 alone, confirming constant growth over the decades.

**Main Authors, Countries and Publication Sources**

The bibliometric analysis presented:

- Most productive authors:
  - *Calof, J.* with 14 articles and 190 citations;
  - *du Toit, ASA* with 10 articles and 209 citations .
- **Main countries:**
  - The United States, the United Kingdom, and Canada lead in quantity and impact;
  - International authors followed the expansion, especially after 2005.
- **Most frequent periodicals:**
  - Journal of Intelligence Studies in Business (12.4% of records);
  - Marketing Intelligence & Planning , both with a predominance of Q1–Q2.

**Co-authorship, Co-citation and Co-occurrence Networks**

Using biblioNetwork(), we identify:

- **Co-authorship network:**
  - Authors such as Calof and du Toit appear in central clusters, with strong international collaboration, reflecting an emphasis on academic partnership.

- **Co-citation of references and authors:**

- Classic references by Porter (1980), Fleisher & Bensoussan (2002) appear as a co-cited “core”;
- Strong connections with work on innovation and foresight (Rohrbeck & Gemünden, 2011).

- **Co-occurrence of terms:**

- Emerging terms such as "data analysis", "information system" and "artificial intelligence" gained prominence especially from 2010 onwards, signaling the popularization of digital CI.

## Diagnosis and Implications

The base of 2,519 articles made it possible to:

- Validate real production trends and themes;
- Confirm the consolidation of IC as a multidisciplinary field with increasing emphasis on the digital age;
- Detect gaps, such as low production in emerging countries and application in SMEs.

This robust analysis confirms the historical and current relevance of CI, pointing to a mature field, with future challenges linked to technology, ethics and organizational contextualization.

## DISCUSSION

A bibliometric analysis of 2,519 Scopus articles (1985–2021) reveals that the concept of Competitive Intelligence (CI) has evolved substantially, driven by technological advancement and organizational complexity. Initially focused on competitive surveillance and structured data collection, CI has, over time, assumed an essential strategic role, going beyond reactivity to anticipate market changes and guide innovation – as highlighted by Fadhlurrahman et al. (2024). Studies such as Big Data Analytics on Competitive Intelligence indicate that data analysis tools expand the capacity to generate intelligence in a scalable and nearly automated manner. Furthermore, the growing intersection between CI, Business Intelligence, and analytics platforms has been confirmed by recent reviews, such as the 2015 -2025 survey, which highlights emerging terms (“big data,” “artificial intelligence,” “cybersecurity intelligence”) and global collaborative networks. However, significant practical challenges are evident, including a lack of qualified professionals, data governance issues, and gaps in application in SMEs and emerging contexts, which demands more specific and contextualized future efforts.

## CONCLUSION

The growing convergence between CI and Business Intelligence, driven by Big Data, automation, and artificial intelligence technologies, has been documented in recent publications that emphasize automation and increased analytical productivity. This evolution supports the recognition of CI as a scalable, responsive, and strategic asset integrated into organizational governance.

However, the literature also highlights persistent challenges such as a shortage of skilled professionals, limitations in data governance, and gaps in the use of CI in SMEs and emerging economies. These constraints highlight that, although CI has reached technological and conceptual maturity, its full adoption still requires attention to contextual, cultural, and structural aspects.

Overall, this work systematizes the evolutionary phases of CI based on empirical data and reliable reviews, contributing to both the academic community and managers who wish to implement robust CI programs. Future studies may delve deeper into cultural and regional differences, as well as the impact of digital CI on organizational performance indicators.

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