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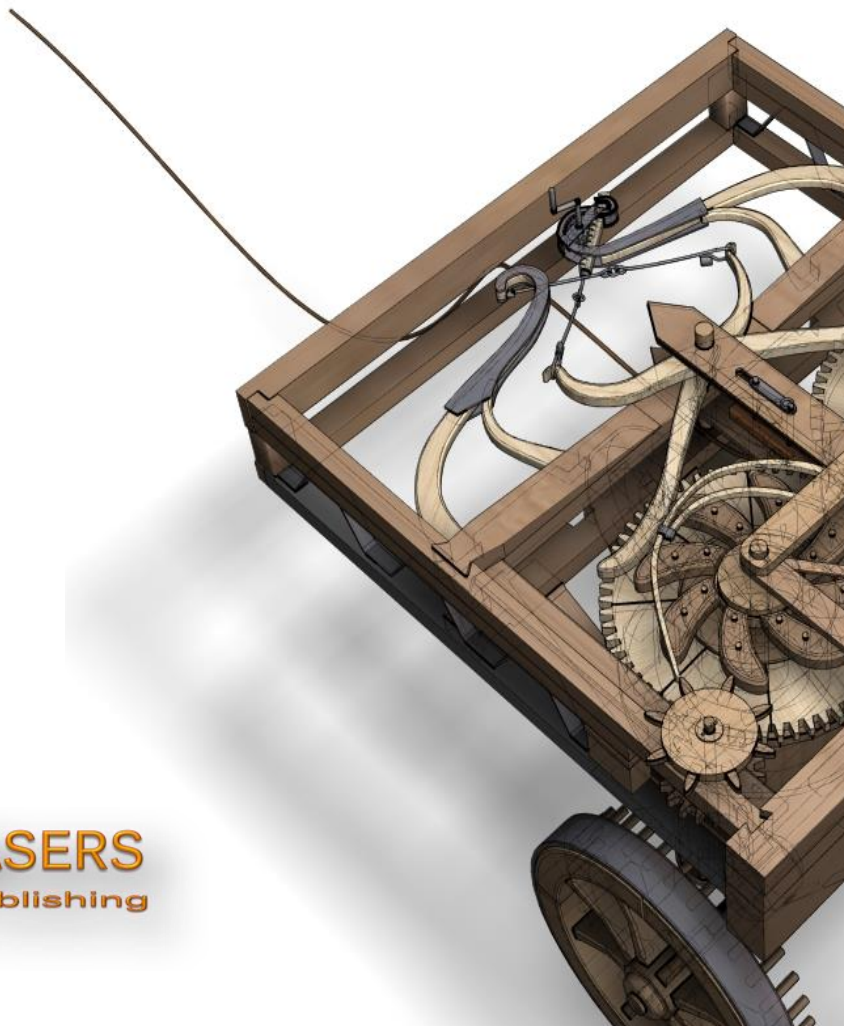

Quarterly
Volume XV
Issue 3(75)
Fall 2024
ISSN 2068 – 7729
Journal DOI
https://doi.org/10.14505/jemt

ASERS
Publishing

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Volume XV
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ASERS Publishing
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Deadline for submission:	15st October 2024
Expected publication date:	November 2024
Website:	https://journals.aserspublishing.eu/jemt
E-mail:	jemt@aserspublishing.eu

DOI: https://doi.org/10.14505/jemt.v15.3(75).13

AI in Competitive Intelligence, Traditional and New Techniques for Gathering and Analysing Data

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Article info: Received 5 June 2024; Received in revised form 26 June 2024; Accepted for publication 23 July 2024; Published 30 August 2024.

Abstract: In this paper we explored the relationship between Artificial Intelligence (AI) and Competitive Intelligence (CI), attempting a definition of CI that considers the various dimensions it is defined by. Thus, we delved into data collection, analysis, and how intelligence is generated. We further analysed how advanced tools and technologies such as machine learning algorithms are used to enable real-time monitoring of competitors to derive CI. Applications of AI/CI to tourism are being discussed in the context of the analysis, bringing a practical approach and insights. We completed our analysis with ethical considerations that have an impact on both the quality of the intelligence and the deeper, social implications. We concluded by proposing a practical definition of CI that incorporates the latest technological advancements, including those brought by AI, with the ultimate goal to provide a reference that ensures companies can draw the best and most reliable results from CI.

Keywords: competitive intelligence; artificial intelligence; business intelligence in tourism.

JEL Classification: O14; O21; O31; D24 ; Z32.

Introduction

1. Literature Review

The tourism industry has become ever more reliant upon data to stay competitive and to increase the offer, reaching new markets and developing new products and services, and to identify emerging travel trends. Tailoring to clients in the era or technology relies on how destinations will be able to attract tourists, as the competition with other destinations is turning global, facilitated by the access to information but also a lower cost of traveling especially by air. Predicting tourist behaviors and preferences as tools of business intelligence becomes thus imperative, and the vast amount of – available –data makes it impossible to track and analyse save for the use of AI.

The first use of “business intelligence” term was back in 1865 by the author Richard Devens in his volume "Cyclopaedia of Commercial and Business Anecdotes". Competitive intelligence is absolutely an old concept, but it emerged as a discipline and a standalone process as of 1970.Until then, companies around the world and regardless the industry reached competitive advantage in their areas thanks to strategic decisions supported by CI but, as authors Gilad and Herring wrote, this was made in a less organized way and without the exact function called Business/Competitive Intelligence. (Gilad, Herring, 2001)

By year 1998, it was estimated that in the US, over 80% of companies with annual revenues of over $10 billion had implemented a BI/CI system. Even mid-sized companies that did not have the capacity to build in-house BI/CI teams outsourced project development, analysis and reporting to consultants and intelligence companies

As stated in the paper “Towards a universal definition of competitive intelligence” written by Rene Pellissier and Tshilidzi E. Nenzhelele in the SAJIM paper, there are many definitions of CI in the literature (Weiss and Naylor

2010) and none has achieved worldwide acceptance (Roitner 2008). These definitions differ only by semantic changes in language and emphasis (Brody 2008).

According to author Ben Gilad a more focused definition of competitive intelligence considers the organizational function responsible for the early identification of risks and opportunities in the market, before they become apparent. Experts also call this process early signal analysis and it results in an early warning system.

Haddadi, Dousset, and Berrada (2010) assert that the absence of a universally acknowledged definition of CI contributes to its perceived lack of clear boundaries. CI is frequently conflated with industrial espionage (Colakoglu 2011).

The literature review shows that CI transformed over time in terms of definition and got various interpretations. Some of the definitions of the CI process are:

"A process of monitoring the competitive environment by pulling together data and information from a very large and strategic perspective, to predict or forecast what is going to happen in the competitive environment of an enterprise (Bose 2008)."

"An ongoing, systematic evaluation of the external environment for opportunities, threats and developments that could have an impact on the enterprise and influence reactive decision-making (Strauss and Du Toit 2010)."

"The process of collecting, analysing and applying information about products, clients and competitors to meet the enterprise's long-term and short-term planning needs (Othenin-Girard, Caron and Guillemette 2011)."

Other definitions are built around the sources of CI:

"The purposeful and coordinated monitoring of your competitors, wherever and whoever they may be, within a specific marketplace (Johnson 2005)."

"Any type of activity aimed at monitoring competitors (potential and current) and gathering information of all types, including about human resource practices, sales and marketing, research and development and general strategy (Tarraf and Molz 2006)."

"CI is the process and forward-looking practices used in producing knowledge about the competitive environment to improve organizational performance" (Madureira *et al.* 2021).

2. Method also Called Materials and Methods or Experimental Methods

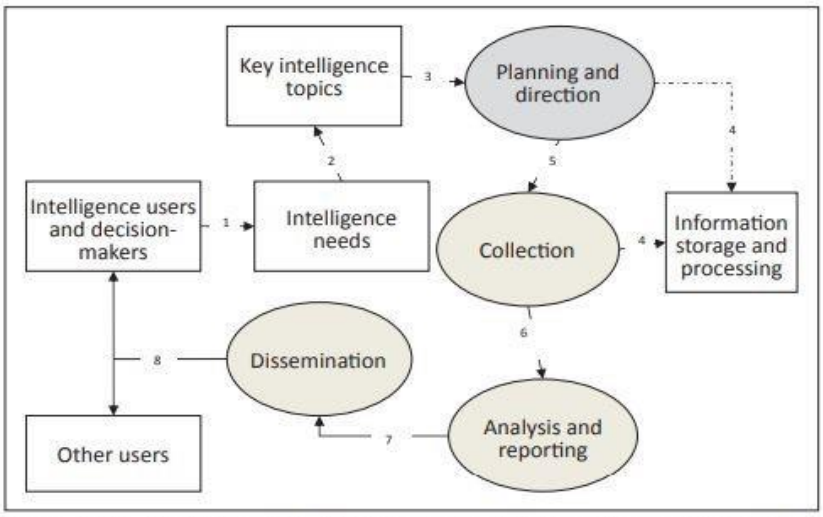
Looking at CI as a process (Figure 1), there are several stages that CI experts build their deliverables on:

Planning: Identifying the purpose and needs of the organization regarding competitive information.

Data collection: Gathering relevant information about competitors, markets, and trends from various sources such as financial reports, press, websites, and other public or private sources of information.

Data analysis: Evaluating and interpreting the collected information to identify patterns, trends, and opportunities relevant to the organization.

Figure 1. Competitive intelligence dimensions



Source: Botha, D.F. & Boon, J.A., 2008, Competitive intelligence in support of strategic training and learning, *South African Journal of Information Management* 10(3), 1–6.

FIGURE 1: The competitive intelligence process.

Source: Madureira et al. (2021)

Generating insights and reports: Developing and presenting reports or analyses that synthesize competitive information and provide relevant insights and recommendations for strategic decisions.

Distribution and use of information: Communicating the analysis results to key decision-makers within the organization and using this information to guide strategic and operational decisions.

Continuous monitoring and updating: Maintaining constant surveillance of the competitive environment to identify relevant changes and developments and updating the information and analyses accordingly.

These recurrent activities can be summarised and categorised under the following four CI processes: planning, collection, analysis and dissemination. (Cavallo *et al.* 2021).

Competitive Intelligence (CI) holds significant importance within the business landscape. There are several factors to be mentioned:

Strategic Decision Making: CI furnishes invaluable insights into market trends, competitor strategies, and industry dynamics, empowering businesses to make strategic decisions based on solid information. By grasping the competitive environment, organizations can pinpoint growth opportunities and pre-empt potential risks.

Risk Mitigation: CI aids businesses in anticipating and managing risks by identifying potential threats and vulnerabilities in the market. This proactive stance enables companies to adjust their strategies and operations, minimizing risks and leveraging emerging opportunities.

Market Position Enhancement: Through the analysis of competitor actions and market shifts, CI assists businesses in spotting market gaps and crafting distinctive value propositions. This enables companies to set themselves apart from competitors and fortify their market stance.

Fostering Innovation: CI delivers insights into emerging technologies, consumer preferences, and industry trends, fueling innovation within organizations. By staying ahead of market advancements, businesses can develop novel products and services that align with evolving customer demands.

Gaining Competitive Edge: By providing timely and relevant information, CI equips businesses with a competitive advantage that competitors may lack. By comprehending competitor strengths and weaknesses, companies can capitalize on opportunities and address threats more effectively.

Optimizing Resource Allocation: CI assists businesses in optimizing resource allocation by pinpointing promising areas and identifying potential risks. By strategically allocating resources based on CI insights, organizations can maximize their returns on investment while minimizing wastage of resources

Overall, CI is indispensable for businesses navigating the intricate and competitive business environment, enabling them to make well-informed decisions, mitigate risks, and seize opportunities for growth and innovation.

However, it is not only businesses but also tourist destinations that can benefit from analysing vast amounts of data that is posted online. As an applied example, AI would be best suited to comb through destination images posted by tourists that reflect in the end their perception of the given destination, while revealing valuable information about the tourist destination. The perception comprises elements of pleasure and sensation, feelings expressed through online platforms where tourists share their experiences, such as Instagram (Blanco-Moreno *et al.* 2024). Understanding the behavior of tourists as reflected in the social media requires an analysis performed using AI techniques, which would ultimately allow destination managers to adjust their goals and strategies, in what we see as an application of CI to tourism that holds significant practical opportunities of expanding from a scientific/past data analysis to a predictive CI model.

3. Research Methodology

Artificial Intelligence (AI) refers to the simulation of human intelligence processes by machines, particularly computer systems. It encompasses various techniques such as machine learning, natural language processing, computer vision, and robotics, among others. AI has gained significant attention and adoption across various industries due to its potential to automate tasks, analyse vast amounts of data and make predictions or decisions. Public perception about AI raises sentiments ranging from total and arguably reckless adoption to a dystopian image (Sheikh *et al.* 2023).

Having said that, we should acknowledge the benefits of AI, while drawing a line to the limitations and the pitfalls of AI, which can lead to negative interpretations and a resistance to change that has no proven basis. However, we deem that an AI governance structure must exist. In fact, several government initiatives have been made in this regard, with Canada becoming in 2017 the first country to implement a national AI strategy (Attard-Frost *et al.* 2024).

In the realm of Competitive Intelligence (CI), AI plays a transformative role in enhancing the effectiveness and efficiency of CI processes. Here are some key aspects of AI's role in CI:

Data Collection and Analysis: AI-powered tools can automate the collection and analysis of data from diverse sources such as websites, social media platforms, news articles, and market reports. These tools can sift through large volumes of data, identify relevant information, and extract actionable insights, thereby streamlining the CI process.

Pattern Recognition and Prediction: AI algorithms excel at recognizing patterns and trends within data, enabling CI professionals to identify emerging market trends, competitor strategies, and consumer preferences. By leveraging predictive analytics, AI can forecast future developments in the competitive landscape, helping businesses stay ahead of the curve.

Natural Language Processing (NLP): NLP technology allows AI systems to understand and process human language, including text data from sources such as customer reviews, forums, and industry reports. NLP enables CI practitioners to extract valuable insights from unstructured data sources, such as sentiment analysis of customer feedback or identification of key market trends from textual data.

Automated Monitoring and Alerts: AI-driven monitoring systems can continuously track changes in the competitive landscape, alerting CI teams to relevant developments in real-time. These automated alerts enable CI professionals to respond swiftly to market shifts, competitor actions, and emerging threats or opportunities.

Enhanced Decision Support: AI-powered analytics tools provide CI professionals with advanced decision support capabilities, enabling them to make data-driven decisions with greater confidence. By integrating AI-driven insights into strategic planning and decision-making processes, businesses can optimize their competitive strategies and resource allocation.

In the tourism industry, ethical considerations and privacy concerns present high stakes, especially since personal data is intrinsically linked to images and videos posted online by tourists. As with any other system, programming biases should be carefully considered to avoid unfair practices. Arguably, the governance structure we referred to above should also consider these practical implications of what should be a responsible use of data.

Overall, AI serves as a powerful enabler of Competitive Intelligence by automating data collection and analysis, facilitating predictive insights, and enhancing decision support capabilities. As AI technologies continue to evolve, their role in CI is expected to expand further, empowering businesses to gain a competitive edge in increasingly dynamic and complex market environments.

4. Research Results

Part of the “process” CI dimension, data analysis implies the information has been gathered via various means – market reports, competitor websites, news articles, social media, and customer feedback – automated or not, and it is used to derive as output meaningful and actionable insights. The quality of the “intelligence”. As Madureira et all (2023) highlighted, the value of intelligence does not reside in it being a factual truth, but rather to provide actionable insights, which would, using the judgement of the analyst, would create more knowledge. This knowledge will then continue to enhance existing data, for a continuation of the cycle that ends with additional information and additional insights that ultimately create more intelligence.

To process vast amounts of datasets and to process that information to derive meaningful and actionable items that would permit the identification of relevant competitive intelligence and insights in terms of threats and opportunities, patterns and trends (Bharadiya, 2023), we need to make us of machine learning algorithms (MLAs). Such MLAs use historical data as data pool from which they draw the relevant conclusions. The sheer amount of data is what makes MLAs essential for the objectives of the tasks to be met, as the volume of information far exceeds human capabilities to process it. Extracting and calculating such volumes of information is nonetheless essential to reveal the hidden potential of the data and to derive competitive intelligence that would advance a company’s competitive edge.

5. Discussions

The link between CI and marketing and the subsequent implications regarding company strategy have been studied for a long time (Calof *et al.* 2008). Strategic management relies on effective CI, especially from a resource planning perspective. As such, AI can be used to maximize CI capabilities and monitor competitor’s activities

CI has been researched in association with Big Data. Characterized by such high volume, speed and variety that makes its transformation into what de facto becomes CI, Big Data is placed at the intersection between information, technology, methods and impact (De Mauro, A. *et al.* 2016). Research also found there is a lack of standardised architecture in the CI process, and that businesses still rely largely on rather basic tools, given the complexity and of maintaining a data warehouse on one hand, and the challenges of the staff and building a big data model that is able to parse through data and identify fake information (Jayanthi R at all, 2021).

Other authors deem that Big Data may not always represent the ideal solution, despite the majority of the firms believing that it will change the competitive landscape and the significant investments in big data (Ghasemaghaei, M. *et al.* 2020).

However, the authors of this paper find fake data to pose one of the most critical challenges to any CI models and any AI models for this matter, whether grouped under the Big Data umbrella or otherwise, since it becomes ever more complex and difficult to identify it correctly and to avoid false positives. Eventually, to overcome these challenges, a final judgement call will require the human intervention of an analyst.

An interesting study on the impact of social media and the challenges to deriving meaningful information for decision making points to the need to identify business events, as observable actions or circumstances, such as a new service or product, that can be further explored in view of drawing a competitive advantage (Yuan, H. *et al.* 2023).

Drawing on events as mentioned above or any similar activity was enabled by the rapid technological advancements. Automating the actions monitor, detect, and analyse competitors' data moved from a manual, labour-intensive and time-consuming exercise to performing AI tools (Forbes, 2024).

Whether regarding data on competitors' prices, various partnerships they enter, customer feedback, or market opportunities, the speed with which a company can analyse all this and mould the information into CI is critical. Time being of the essence, it required 24/7 digital capabilities. We must draw the attention to the aspect we have mentioned above, which is the need to have a final call made by an analyst that, despite human limitations and possible errors, remains a reliable factor when deciding which CI should be used for business purposes that bear financial and strategical implications.

There is a growing concern amongst all stakeholders - whether general public, regulators, or companies - about the ethics around AI in general and its deployment in particular, with a focus on reducing or ideally eliminating biases and discrimination, ensuring a transparent modus operandi, making the results more trustworthy, accessible and better interpretable according to various inputs (Bharadiya *et al.* 2023).

Conclusions and Further Research

Based on the analysis above, we propose as definition of CI the systematic and ethical process through which companies monitor and maximize publicly available information and internal intelligence on competitors using AI and traditional methods to make strategic decisions.

We deem this definition covers the aspects researched already in the doctrine, while offering a clean – and clear – link between the volume of data, type of data, means used to process the information, capabilities necessary, and technology progress needed to move from data to information to competitive intelligence using AI using a balanced approach, which is ethical and provides tangible competitive advantages.

The significant benefits tourism can draw from integrating AI into CI translate into a better planning and an enhanced operational efficiency, built on developing and tailoring products and services using AI insights on travel behavior, preferences, trends, and (new) needs of the travelers that otherwise would be challenging to identify. The success of this approach relies on one hand on how ethical the practices are, and how reliable and accurate the results are on the other hand. These are the two faces of the same coin, since any progress stemming from an enhanced use of CI in the context of large amounts of publicly available data can only be sustained if ethical considerations are addressed.

We acknowledge that some limitations to the present study may stem from the fact that we did not apply the definition to a wide range of cases. Therefore, some additional tests may be conducted to further our research and to strengthen our definition. Nevertheless, the authors of this study are confident that applying the proposed definition fits well with the goal of providing a reference for companies to draw the best and most reliable results from CI, maximizing the benefits from AI, and reinforcing the framework for a practical yet ethical use of information.

Credit Authorship Contribution Statement

Silvia Denisa Taranu: Conceptualization, Investigation, Methodology, Project administration, Formal analysis, Writing – original draft, Writing – review and editing.
Adrian Gabriel Cioranu: Conceptualization, Investigation, Methodology, Project administration, Formal analysis, Writing – original draft, Writing – review and editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Declaration of Use of Generative AI and AI-Assisted Technologies

The authors declare that they have not used generative AI and AI-assisted technologies during the preparation of this work.

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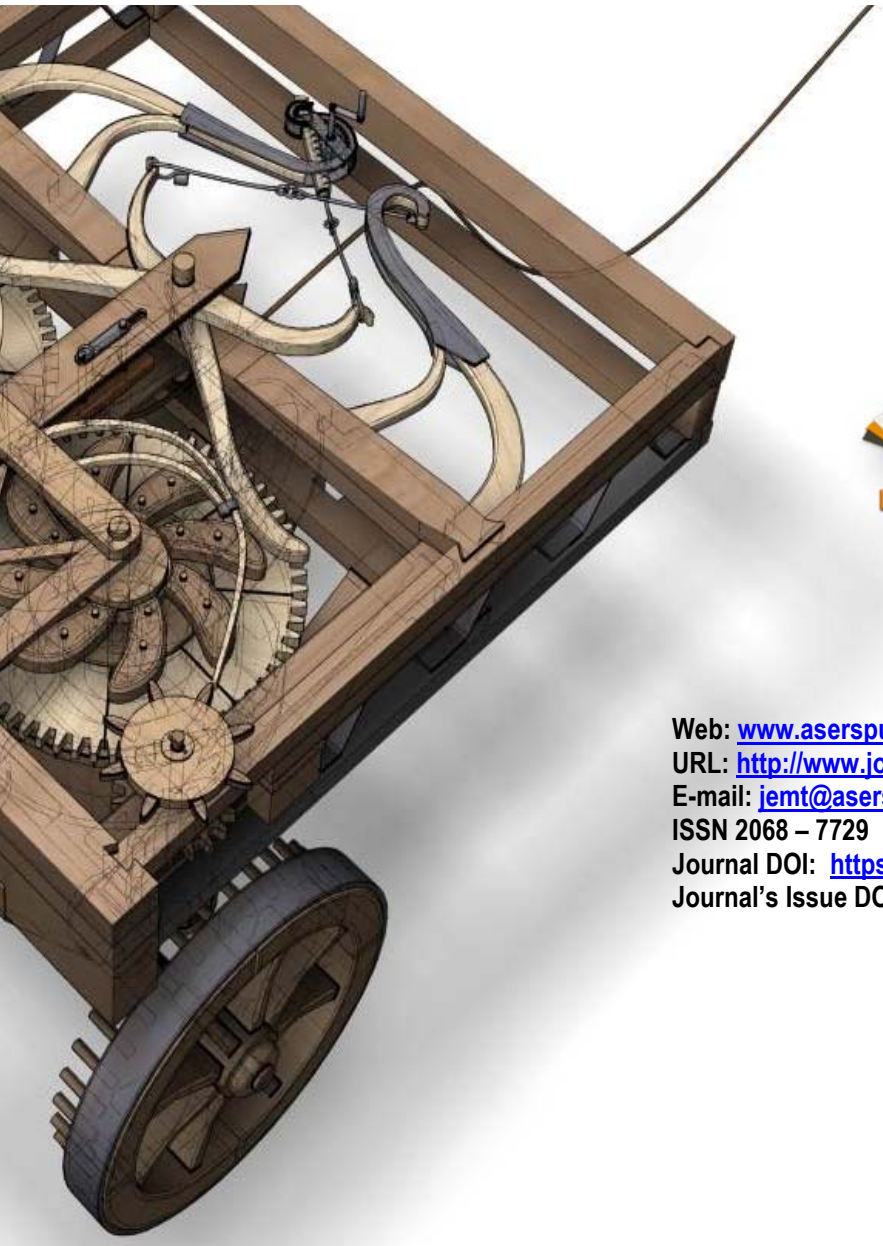

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