

DOCTORAL PROGRAMME

Information Management

Competitive Intelligence Science

Unified View, Modular Definition, Instruments, and Mindset

Luís Alexandre Abrantes Madureira

A thesis submitted in partial fulfilment of the requirements

for the degree of Doctor in Information Management

NOVA Information Management School
Instituto Superior de Estatística e Gestão de Informação

Universidade Nova de Lisboa

NOVA Information Management School
Instituto Superior de Estatística e Gestão de Informação
Universidade Nova de Lisboa

COMPETITIVE INTELLIGENCE SCIENCE: UNIFIED VIEW, MODULAR DEFINITION, INSTRUMENTS, AND MINDSET

by

Luis Madureira

Doctoral Thesis presented as a partial requirement for obtaining the
PhD in Information Management

Supervisor / Co Supervisor: Mauro Castelli

Co Supervisor: Aleš Popovič

March 2023

STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism, any form of undue use of information, or falsifying results along the process leading to its elaboration. I further declare that I have fully acknowledged the Rules of Conduct and Code of Honour from the NOVA Information Management School.

Luis Alexandre Abrantes Madureira

Lisbon, 31 March 2023

DEDICATION

This achievement would be impossible without the support of my soulmate. She is the unsung hero beyond this endeavour. It was her myriad daily successes that allowed me to focus and succeed in this endeavour. Apologies to my daughters for the time I private them from in this pursuit of mine. They were my true “Editors in Chief.”

Coming from a family of scholars, although not so much academics, I hope this work makes them proud and makes the family name stand the test of time. A special word for the unconditional support of my parents, grandparents and great-grandparents throughout my life. Without your guidance and inspiration, I would not be writing these words.

This is to you.

ACKNOWLEDGEMENTS

The present work results from the love of learning and the love of the science I fall in love with, Competitive Intelligence (CI). One can say this was a labour of love. Six years of hard scholarly work sprinkled with business projects like a Business War Game in India, some ongoing consulting projects, and teaching three topics in four countries.

It all started 16 years ago with the invitation from Alberto da Ponte, CEO of Heineken Portugal, to set up and take the CI function to World Class Level. Thank you for your trust.

A special thank you to:

- Jorge Carrola Rodrigues for the inspiration to pursue a PhD.
- Miguel Castro Neto for his invitation to teach at NOVA Information Management School (IMS), which highly influenced my decision to pursue my PhD at this school.
- Manuela Aparício, Chemi Tsering, and Nelson Silva for the knowledgeable exchanges and true support.
- Professors Arun Rai and Viswanath Venkatesh for sharing their valuable knowledge on Theory Development. I hope I was up to your standards.
- PhD Course Directors for believing in the added value I could bring to science.
- Prof Jorge Velosa for teaching me the skill of quantising ideas.
- All my previous educators made me who I am today.
- My colleagues from the kindergarten to the doctoral schools. You taught me well.
- The CI Community, the CI Fellows, and the SCIP CEOs in particular.
- Jonathan Calof, Craig Fleisher, Andrew Beurschgens, and Ben Gilad, the ultimate sceptical analyst, taught me critical thinking. I hope this work serves you well.
- Editors and anonymous reviewers who contributed to shaping the final outcome.
- My students, for the inspiration I get from our exchanges and push me to elevate my understanding of CI.

Last but not least, a few very special words for my ‘sherpas’ throughout this journey towards the peak of knowledge and enlightenment. Aleš’s pragmatism and experience grounded me in reality and helped me navigate through procedural fog successfully. Mauro’s enthusiasm, optimism, and Italian flair made me smile every time and pushed me towards my best efforts. I could not have asked for a better duo of travel companionship.

A sincere thank you for the opportunity to build on the shoulder of giants like you!

PUBLICATIONS

- Madureira, L., Castelli, M., & Popovic, A. (2019, October 10-12). *Design Thinking: the new mindset for competitive intelligence? Impacts on the competitive intelligence model* [Paper presentation]. CAPSI 2019 Proceedings. 26. <https://aisel.aisnet.org/capsi2019/26/>
- Madureira, L., Popovic, A., & Castelli, M. (2021). Competitive intelligence: A unified view and modular definition. *Technological Forecasting and Social Change*, 173(December 121086), 1–17. <https://doi.org/10.1016/j.techfore.2021.121086>
- Madureira, L., Popovic, A., & Castelli, M. (2021). *Competitive intelligence empirical construct validation using expert in-depth interviews study* [Paper presentation]. 2021 IEEE International Conference on Technology Management, Operations and Decisions (ICTMOD 2021). <https://doi.org/10.1109/ICTMOD52902.2021.9739422>
- Madureira, L., Popovic, A., & Castelli, M. (2023). Competitive intelligence maturity models: Systematic review, unified model, and implementation frameworks. *Journal of Intelligence Studies in Business*, 13(1), 1–29. <https://doi.org/10.37380/jisib.v13i1.988>
- Madureira, L., Popovic, A., & Castelli, M. (in press). Competitive Intelligence Empirical Validation and Application: Foundations for Knowledge Advancement and Relevance to Practice. *Journal of Information Science*.

ABSTRACT

This research focuses on Competitive Intelligence (CI) as a precursor of sound decisions that improve and sustain the performance of organisations in an exponentially changing world. The absence of an empirically validated scientific definition is a foundational gap that hinders its art, practice and science. So far, the lack of conceptual consensus and delimitation of the body of knowledge inhibited the establishment of a profession, education, and the advancement of the discipline. Thus, the aim of this study is to lay down the foundations of CI science and the developments of its praxis. A mixed-methods approach was used to derive a scientific definition and provide an empirical validation grounded in the expertise of top subject matter experts. A meta-analysis supported the development of a unified, integrative, thorough maturity model and a set of instruments to guide its implementation and development. Furthermore, the design thinking mindset was identified as appropriate in support of its practice. Overall, the empirically validated scientific definition, the maturity model, the implementation frameworks, and the design thinking mindset are expected to put the CI virtuous cycle in motion catapulting its praxis into a new era. More importantly, they should contribute to improving the performance of professionals, organisations, industries and countries, differentiating CI versus related disciplines, promoting admittance in academe, and mobilising all stakeholders towards developing its practice, education, and theoretical advancement.

Este estudo foca-se na Competitive Intelligence (CI) como precursora de decisões acertadas que melhoram a performance das organizações num mundo em mudança exponencial. A ausência de uma definição científica validada empiricamente é uma lacuna fundamental que prejudica a sua arte, prática e ciência. À data, a falta de consenso conceptual e delimitação do seu corpo de conhecimento inibiu a efetuação da profissão, da educação, e do avanço da disciplina. Como tal, o objetivo deste estudo é estabelecer os alicerces da ciência do CI e o desenvolvimento da sua praxis. Uma abordagem de métodos mistos foi usada para derivar uma definição científica e providenciar uma validação empírica fundada no expertise de especialistas de topo nesta matéria. Uma meta-análise suportou o desenvolvimento de um modelo de maturidade unificado, integrativo, e minucioso, e um conjunto de instrumentos para guiar a sua implementação e desenvolvimento. Para além disso, o design thinking enquanto mentalidade foi identificado como apropriado para suportar a sua prática. No compito geral, é esperado que a definição científica validada empiricamente, o modelo de maturidade, os frameworks de implementação, e um quadro mental de design ponham em movimento o ciclo virtuoso da CI catapultando a sua praxis para uma nova era. Mais importante, devem contribuir para melhorar a performance de profissionais, organizações, indústrias e países, diferenciando o CI versus as disciplinas relacionadas, promovendo a sua admissão na academia, e mobilizar todos as partes interessadas para o desenvolvimento da sua prática, educação, e o desenvolvimento teórico.

KEYWORDS

Competitive intelligence science (CIS); Unified View; Modular definition; Body of knowledge (BoK); Maturity model; Design thinking mindset.

Sustainable Development Goals (SGD):



INDEX

1. INTRODUCTION	1
1.1. Background	1
1.2. Problem Statement	1
1.2.1. Business problem	1
1.2.2. Academic problem	1
1.2.3. Scientific problem	2
1.3. Activity Statement	2
1.3.1. Hypothesis	2
1.3.2. Objective	2
1.3.3. Expected contributions	2
1.4. Forecasting Statement	3
2. THEORETICAL BACKGROUND	4
2.1. CI Science	4
2.1.1. Scientific object of study	4
2.1.2. Research problems, methods, and paradigm	5
2.1.3. Scientific evolution milestones	7
2.1.4. Relation to other disciplines and sciences	11
2.2. CI Education	11
2.3. CI Profession	12
3. COMPETITIVE INTELLIGENCE: A UNIFIED VIEW AND MODULAR DEFINITION	13
3.1. Introduction	13
3.2. Materials & Data Set	17
3.3. Methodology	18
3.3.1. SCIP bibliography as CI's foundational body of knowledge	20
3.3.2. Thesaurus, controlled vocabulary, and ontology for future classification and interpretation	20
3.3.3. Search strategy & keywords: identifying relevant publications with CI definitions from 2007	20
3.3.4. Definition corpus development	21
3.3.5. Topic modelling: identifying CI defining dimensions and descriptors	21
3.3.6. Analysis of Competing Hypotheses	23

3.3.7. Development of a unified view on CI: proposed definition	24
3.4. Results & Discussion	24
3.4.1. Number of the core defining dimensions	25
3.4.2. Descriptors of the core defining dimensions	26
3.4.3. Validation of Hypotheses and identification of the core defining dimensions	26
3.4.4. Meta-inferences: induction of the unified view and modular definition	32
3.4.5. Limitations of the study	39
3.5. Conclusion	40
4. COMPETITIVE INTELLIGENCE EMPIRICAL CONSTRUCT VALIDATION USING EXPERT IN-DEPTH INTERVIEWS STUDY	42
4.1. Introduction	42
4.2. Method & Results	43
4.2.1. Data Collection: Sample Selection & Interview Protocol	43
4.2.2. Data Reduction: Flexible Coding and CATA	44
4.2.3. Data Analysis: Empirical Construct Validation	45
4.2.4. Content Validity	45
4.2.5. External Validity	46
4.2.6. Reliability	46
4.2.7. Discriminant Validity	46
4.2.8. Data Interpretation: Inferences and Meta-inferences	49
4.3. Discussion	50
4.4. Conclusion	50
5. COMPETITIVE INTELLIGENCE MATURITY MODELS: SYSTEMATIC REVIEW, UNIFIED MODEL, AND IMPLEMENTATION FRAMEWORKS	52
5.1. Introduction	52
5.2. Literature Review	53
5.2.1. Definition of Key Variables and Study Boundaries	54
5.3. The CIMMs State Of The Art	55
5.3.1. Literature Search Results	55
5.3.2. Overview of the selected CIMMs	56
5.3.3. CIMMs benchmark vis-à-vis the CI 5Ps and descriptors	58
5.4. Discussion of findings	61
5.4.1. Dimensions level	61

5.4.2. Aspects level	62
5.4.3. CIMMs	62
5.4.4. Integration of CIMMs into a proposed UCIMM	63
5.4.5. Limitations and future research	69
5.5. Conclusion	69
5.6. Declarations	70
5.6.1. Author Contributions	70
5.6.2. Funding	70
5.6.3. Conflicts of Interest	70
6. DESIGN THINKING: THE NEW MINDSET FOR COMPETITIVE INTELLIGENCE?	71
6.1. Introduction	71
6.2. Material & Methods	72
6.3. Competitive Intelligence Model	73
6.3.1. Competitive Intelligence	73
6.3.2. Competitive Intelligence Projects	73
6.3.3. Competitive Intelligence Process Overview & Potential Pitfalls	74
6.4. Design Thinking Mindset & Guiding Principles	79
6.4.1. Design Thinking Impact on the CI Model	80
6.5. Conclusion	84
6.6. Limitations and Recommendation	85
7. RESULTS AND DISCUSSION	86
7.1. Summary of main findings	86
7.2. Discussion	86
7.3. Contributions	87
8. LIMITATIONS & FUTURE RESEARCH AGENDA	88
9. CONCLUSION	89
10. REFERENCES	90
APPENDIX	114
Appendix 1: PRISMA Checklist	114
Appendix 2: CIMMs Further Detailed Characterisation	117

LIST OF FIGURES

Figure 1.1 – CI Virtuous Cycle (Madureira et al., 2021a)	3
Figure 3.1 – Definition corpus split by type of publication	18
Figure 3.2 – Scatter plot of the Elbow Method - five clusters as the optimal number of the core defining dimensions	25
Figure 3.3 – Number of definitions and respective weights per dimension (assigned to topic)	26
Figure 3.4 – Process core defining dimension descriptors and respective weights.....	27
Figure 3.5 – Purview core defining dimension descriptors and respective weights	29
Figure 3.6 – Product core defining dimension descriptors and respective weights	30
Figure 3.7 – Purpose core defining dimension descriptors and respective weights	31
Figure 3.8 – Practice core defining dimension descriptors and respective weights	32
Figure 3.9 – Modular definition and top-down and bottom-up meta-inferences development process.....	33
Figure 3.10 – CI Process core defining dimension detail.....	34
Figure 3.11 – CI Purview core defining dimension detail	35
Figure 3.12 – CI Product core defining dimension detail.....	36
Figure 3.13 – CI Purpose core defining dimension detail	36
Figure 3.14 – CI Practice core defining dimension detail	37
Figure 3.15 – The Virtuous Cycle of CI - Author’s development.....	41
Figure 4.1 – Data Sets and Data Analysis Roadmap for CI Construct Validation	45
Figure 5.1 – Fundamental characterisation of MMs (Lahrmann & Marx, 2010, tbl. 1).....	55
Figure 5.2 – PRISMA 2020 flow diagram used for the systematic review (Page, Moher, et al., 2021)	56
Figure 5.3 – UCIMM hierarchical meta-model – dimensions, aspects, and sub-aspects (adapted by the authors).....	64
Figure 5.4 – CI Purpose (developed by the authors)	66
Figure 5.5 – CI Purview (developed by the authors)	67
Figure 5.6 – Core CI Model: Practices and Process (developed by the authors).....	68
Figure 5.7 – CI Product (developed by the authors).....	69
Figure 6.1 – CI Model adapted by the author from (Araujo et al., 2017; Pellissier & Nenzhelele, 2013a)	75
Figure 6.2 – Intelligence Cycle phases description and respective pitfalls, Carlgren’s DT mindset and guiding principles, potential contribution to solve identified pitfalls, and two illustrative practical examples	84

LIST OF TABLES

Table 2.1 – CI scientific structure and research system for CI (Marcial & Suaiden, 2016)	5
Table 2.2 – Areas of CI with varying added value (Vejlupek, 2008)	6
Table 2.3 – Previous Research Paradigm (Marcial, 2018)	6
Table 2.4 – CI specific analytical methods (Michaeli, 2013)	7
Table 3.1 – Data set overview: Publications, publication corpus, and definition corpus split by source	17
Table 3.2 – Unified view versus most cited and recent definitions Contribution of the unified view compared to most cited and recent CI definitions ordered by citations	38
Table 4.1 – Final Word Lists by CI Dimension	47
Table 4.2 – Holsti (1969) Interrater Reliability	47
Table 4.3 – Holsti (1969) Interrater Reliability	48
Table 4.4 – LDC & EDC One-Sample <i>t-Test</i> Results	48
Table 4.5 – Holsti (1969) Interrater Reliability	48
Table 4.6 – LDC Cronbach α and ω Coefficient	48
Table 4.7 – EDC Cronbach α and ω Coefficient	49
Table 4.8 – LDC Correlation Matrix ^b	49
Table 5.1 – Overview of the literature review based on PRISMA, Cooper and Webster & Watson Guidance (Cooper, 1988; Page, Moher, et al., 2021; Webster & Watson, 2002)	53
Table 5.2 – Detailed characterisation of included CIMMs (developed by the authors)	56
Table 5.3 – Integration and benchmark of included CIMMs vis-à-vis the Unified View and Modular Definition of CI (Madureira et al., 2021a)	58
Table 5.4 – The UCIMM prepared by the authors builds on the unified view of CI (Madureira et al., 2021a)	65

LIST OF ABBREVIATIONS AND ACRONYMS

VUCA	Volatile, Uncertain, Complex and Ambiguous
CI	Competitive Intelligence
Bok	Body of Knowledge
DT	Design Thinking
MIS	Marketing Intelligence System
AI	Artificial Intelligence
BI	Business Intelligence
CIS	Corporate Intelligence Systems
ACI	Augmented Competitive Intelligence
ACH	Analysis of Competing Hypotheses
NLP	Natural Language Processing
SCIP	Strategic and Competitive Intelligence Professionals
SIS	Strategic Intelligence System
CIS	Corporate Intelligence Systems
ACI	Academy of Competitive Intelligence / Augmented Competitive Intelligence
ABRAIC	The Brazilian Association of CI Analysts
ICI	Institute for Competitive Intelligence
AGI	Artificial General intelligence
SCI	Social Collective Intelligence
HAI	Human-centred Artificial Intelligence
GPT	General Pre-trained Transformers
ISB	Intelligence Studies in Business
CIP	Competitive Intelligence Professional
ACH	Analysis of Competing Hypotheses
NLP	Natural Language Processing

CATA	Computer-Aided Text Analysis
LDA	Latent Dirichlet Allocation
MALLET	Machine Learning for Language Toolkit
SSE	Sum of Squared Errors
KIT	Key Intelligence Topic
KIQ	Key Intelligence Questions
5Ps	Purpose, Purview, Practices, Process, and Product (CI dimensions)
CATA	Computer-aided Text Analysis
LDC	Literature Definition Corpus
DWL	Dimension World Lists
EFC	Experts Feedback Corpus
EDC	Experts Definition Corpus
CIMM	Competitive Intelligence Maturity Model
APQC	American Productivity & Quality Center
CIF	CI Functions
CIP	CI Programs
UCIMM	Unified Competitive Intelligence Maturity Model
MM	Maturity Model
CMM	Capability Maturity Model
CMMI	Capability Maturity Model Integration
CL	Capability Levels
AIMM	Artificial Intelligence MM
TAR	Timely, Actionable, Accurate, Relevant (quality intelligence)
HUMINT	Human Intelligence (primary sources)
ACE	Advocacy, Control, Ethics framework

1. INTRODUCTION

1.1. BACKGROUND

For an organisation to endure in time, it must understand the past, exploit the present and foresee the future. However, what is known does not really matter until it is actioned. Actions impact reality. Decision makers need sound actionable insights – intelligence – to improve the performance of their organisations. Competitive Intelligence (CI) is critically important to navigate a VUCA and exponentially changing world (Bennett & Lemoine, 2014). Thus, success depends on implementing, developing, and ultimately mastering CI.

1.2. PROBLEM STATEMENT

CI has been defined in myriad ways over the last century. However, a foundational theory based on an integrative and empirically validated definition is still missing. In addition, the inherent polysemy and synonymy undermine consensus. Most importantly, the lack of a Body of Knowledge (Bok) results in the absence of boundaries on what CI professionals and scholars need to know, learn, and master. Therefore, the implementation and development of CI are inhibited, and measurement is imprecise. In summary, the praxis – the practice of the skill, art and science (Merriam-Webster, 2023) – is compromised (Prescott, 2014).

1.2.1. Business problem

On the business side, the profession lacks effectuation as practitioners struggle to delimit their professional scope and identify the specific knowledge needed to guide their practice (Gilad & Herring, 2001; Klavans, 1995). The lack of conceptual clarity inhibits the accurate measurement of the implementation level and development of CI practice. This fact compromises the development of best practices identification and generalizability (Lee & Baskerville, 2003). The business impacts on the decision-making and performance of organisations are broad and deep. Considering that CI supports informed strategic, tactical, and operational decisions at all organisational levels, functions, and time horizons, the resulting entropy is proportional to the dimension of organisations, industries and countries (Dashman, 1998; Cavalcanti, 2005; Yap & Rashid, 2011; Adidam et al., 2012; Yap et al., 2013; Stefanikova, 2014; Stefanikova et al., 2015; Nenzhelele, 2016; Tahmasebifard, 2018; Yap et al., 2018; Yin, 2018; Alshammakh & Azmin, 2021; Huang et al., 2022). It is not random that the organisations and countries at the forefront of CI are the most advanced.

1.2.2. Academic problem

On the education side, the CI construct blurriness challenges the design of a thorough curriculum to teach in colleges, universities, and business schools. Therefore, it is no surprise that the teaching of CI is underrepresented in academia compared to marketing, management, economics, finance, or political science (Soilen, 2015). The lack of CI education is especially relevant given that CI is a precursor and critical success factor to most

management disciplines (Miller, 1994; Fleisher, 2004; Fleischman, 2022). Thus, CI as a multidisciplinary science is of utmost importance to practitioners, professionals, decision-makers, executives, policy-makers, scholars, researchers, academe, organisations, industries, countries, economic development, education, and society, constituting impactful management research (Wickert et al., 2020).

1.2.3. Scientific problem

On the science side, prior research on defining CI is limited to five proposed definitions, none of which are scientifically validated (Bartes, 2014; Breakspear, 2013; Brody, 2008; Marcial, 2018; Pellissier & Nenzhelele, 2013b). This fact challenges reproducibility, replicability, and generalizability, the fundamental preoccupations of any science and scientific practice (Bollen, 2015). Moreover, the inherent absence of a sound and consensual CI BoK hinders its research and theoretical development. As a result, CI theory is scattered through the multitude of disciplines it impacts with limited scientific publication outlets (Soilen, 2015; Lopez-Robles et al., 2020). Thus, the foundational cornerstones of CI science are missing, a pivotal research gap that is imperative to fill urgently.

1.3. ACTIVITY STATEMENT

1.3.1. Hypothesis

The working hypothesis is that the lack of a scientific and empirically validated definition results in a vicious cycle impeding the *de facto* establishment of CI science. The undefined profession results in the abridged demand for CI professionals. The reduced demand results in the lack of CI education offerings. The resulting reality is the lack of awareness and know-how, which explains the scarcity of CI programs and functions implemented in organisations, despite the unprecedented change. The weak CI practice impedes the empirical validation of theoretical endeavours in the field, compromising the establishment and development of CI science. Consequently, the sustainability of organisational performance is at risk, given that CI science is the immediate pivotal antecedent.

1.3.2. Objective

Considering the exposed above, this study aims to lay down the foundational cornerstones of CI Science. Primarily, we intend to fill the gap in the literature for a scientific and empirically validated definition validated by all cohorts of stakeholders. Secondly, we aim to provide the instruments to guide and measure CI implementation to promote the development of its maturity level within organisations.

1.3.3. Expected contributions

The overarching expected contribution of this study is to put the CI Virtuous Cycle (Figure 1.1) in motion. A scientific and empirically validated CI definition should allow for delimiting the CI BoK, impacting the effectuation of the profession and generating demand for

education, thus promoting the need for theory building. A set of instruments to guide, measure, and develop CI implementation – maturity model and implementation frameworks – are expected to contribute to the development of the CI praxis by improving practice and empirically testing theoretical advancements. Finally, the Design Thinking mindset and its implications for CI practice proposed are expected to orient the application of the instruments offered.

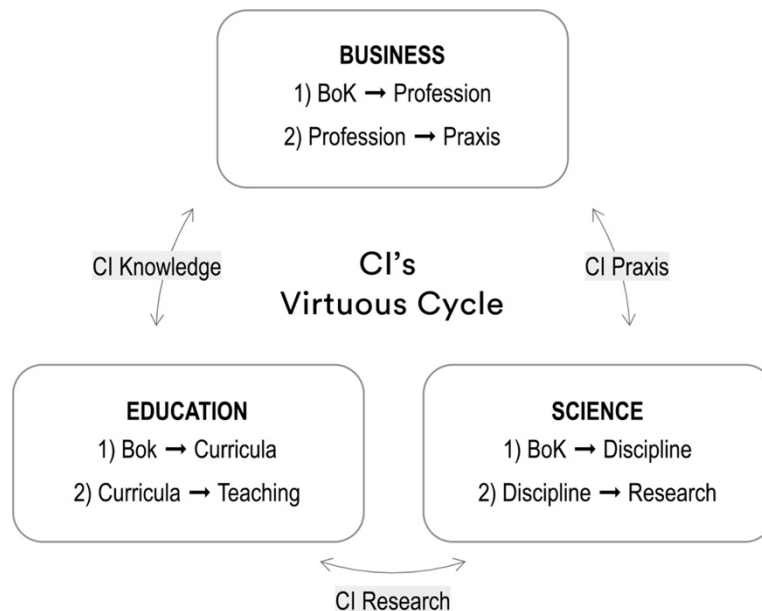


Figure 1.1 – CI Virtuous Cycle (Madureira et al., 2021a)

Overall, the contributions of theory-building and testing from this study are expected to contribute to the professionalisation and generalizability of CI. Ultimately, this is expected to move from CI as a product, process, and practice to CI as a science.

1.4. FORECASTING STATEMENT

In the immediate chapter, we give a more detailed theoretical background on the critical constructs under analysis to provide context for the following chapters. First, we present a CI unified view and modular definition, providing an overarching integrated view of the discipline while allowing extensive depth when defining and differentiating related granular concepts. The empirical validation of the proposed definition follows to substantiate its grounding and generalisation across stakeholder cohorts. Next, we devise a measurement instrument to assess and improve the implementation of the construct in praxis. Finally, we propose Design Thinking (DT) as the mindset for CI in parallel with its main contributions to improving its process. Overall, this study provides a scientific toolkit as the foundation for establishing and developing CI Science.

2. THEORETICAL BACKGROUND

2.1. CI SCIENCE

According to the Philosophy of Science, a scientific discipline must present several characteristics (Kuhn, 1962; Popper, 1962). First, it must have a scientific object of study that is clearly defined and consensual among practitioners. Clarity on the scientific object of study guarantees the understanding of the essence (what is its significance), the definition of the structure (how theories, models, and methods within it are related), the reason for being (why it exists), and the purpose of the discipline (what is it for). Second, a discipline must solve research problems that are clearly identified. Third, these problems should be addressed using the scientific method through identified specific research and applied methods. Lastly, the scientific evolution milestones should be well documented.

Soilen (2015) questions to what extent CI is a scientific discipline as “it contains a body of particular knowledge, has experts, and it must be possible to separate it from other areas of knowledge. A discipline is defined as a branch of science developed by a group of specialists who all adhere to the same practice and research.”

Patton (1990, 2015) proposed a model for science as a collection of paradigms. According to Crotty (1998), a paradigm focus on the critical relationship between ontology (theory of being – what is CI), epistemology (theory of knowledge – how do we know CI), and methodology (theory of method – how do we develop CI). A research paradigm can be defined as the collective set of attitudes, values, beliefs, procedures and techniques that create a framework of understanding through which theoretical explanations are formed (Trochim et al., 2016).

Therefore, for CI science to be established, a scientific definition must be the starting point (Soilen, 2015) to empirically validate the characteristics of the discipline and allow for identifying the respective research paradigm.

2.1.1. Scientific object of study

A scientific definition consensual within the community of practitioners (empirically validated by all stakeholder cohorts) addresses the first characteristic of CI science. Such a definition should communicate the essence and clarify the theoretical underpinnings. In turn, this allows for delimiting scientific structure in a scoped BoK and ontology, identifying the origins and the purpose for existence.

Extant literature cannot provide such a definition, nor the existing communities of practice (SCIP.org or CIFellows.com). As a brief example, the purpose of CI is identified as the “decision-making and negotiation” for “sustaining or improving competitiveness” (Marcial, 2018), “strategic decision-making of the company’s top management” (Bartes, 2014), “helping decision-making and providing a competitive advantage” (Pellissier & Nenzhelele, 2013b),

identifying change as an opportunity or threat (Breakspear, 2013), “decision-making” (Brody, 2008), and “reduce strategic risk and increase revenue” (SCIP, 2022). The author dares to state that none is the ultimate aim of CI, but they are just a means to an end.

However, Marcial and Suaiden (2016) propose a scientific structure and research system for CI that would benefit from a new, thoroughly defined definition (Table 2.1).

Table 2.1 – CI scientific structure and research system for CI (Marcial & Suaiden, 2016)

RESEARCH LEVEL	PRODUCTS	RESULTS
Epistemology	Paradigms	Cognitive
		Physical
		Social
Scientific	Theories	Knowledge Theory
		Decision Theory
		Communication Theory
		Information Theory
		Systems General Theory
		Competitive Theories
		Intelligence General Theory
	Models	Intelligence Cycle
		Counterintelligence
		Environmental Scanning
		CI System
	Methods	Industry & Competitor Analysis (e.g., Michel E. Porter)
		Scenario Development
		Benchmarking
		Social Media Analysis
		Text Mining
		Early Warning
		Blindspot
	Techniques	Key Intelligence Topics
		Interviewing Techniques
Applied	Solutions	CI process improvement
		Other organizational processes improvement

2.1.2. Research problems, methods, and paradigm

The research problems can only be thoroughly identified once the scope of CI is clear. Once again, an empirical scientific definition is instrumental to delimit and identify the research problems of the discipline. The nature of the problems will then determine the specificity of the methods, adequate theories, and models to solve them. Thus, the research system and corresponding paradigms of CI are dependent on its definition.

The main definitions of CI provide some insights into the challenge at hand. Breakspear refers to the application of CI from a perspective of policy development. Pellissier, Bartes and Marcial agree that CI research focuses on issues related to strategic management and decision-making. Bartes (2014) cites Vejlupek (2008) to justify the main focus as strategic (Table 2.1).

Table 2.2 – Areas of CI with varying added value (Vejlupek, 2008)

ADDED VALUE	PURPOSE		
	OPERATIVE	TACTIC	STRATEGIC
SELECTION (filtering)	Topical research and monitoring		
ASSESSMENT (classification)	Contextual research and monitoring	Summary research and monitoring	
INTERPRETATION (understanding)	Situational analyses (description of relations)	Development analyses (development of relations – retrospective)	Comprehensive analyses (causes of relations and forecast of development)

According to Marcial (2018), CI studies the properties and behaviour of 1) information used in the decision-making and strategic information production that supports strategic decision-making; 2) forces that govern the flows and use of information within and inter organisations; 3) production and protection of strategic information for commercial purposes; 4) the process of monitoring the competitive environment. Marcial (2018) goes further in detailing the research problems/questions and general research methods and types up to 2002, providing the research paradigm (Table 2.3). Additionally, there is considerable research and literature on CI-specific analytical research methods, frameworks, and techniques, of which the books of Fleisher & Bensoussan (2015) and Michaeli (2013) are references (Table 2.4).

Table 2.3 – Previous Research Paradigm (Marcial, 2018)

RESEARCH QUESTIONS	METHODS	TYPE
Propose, present, evaluate CI Systems	Bibliographic survey	Exploratory
CI historic evolution	Case study	Descriptive
Propose/identify model linking environmental scanning to CI needs	Statistical survey	Experimental
Demonstrate the relationship between CI and decision-making process	Historical method	
Propose/identify model/method of analysis	Comparative method	
Identify epistemological/philosophical issues of CI and establish terminology	Documentary survey	
Propose model demonstrating the relationship between CI and strategic management	Action research	
Investigate/map/propose a model of competencies of the CI professional	Others	
Identify philosophical issues in the field of ethics in the context of CI		
Propose CI model		

RESEARCH QUESTIONS	METHODS	TYPE
Propose/identify tools for CI		
Analyse the performance of the CI professional		
To highlight the relationship between social networks and CI		
Identify the use of CI by organizations		
Propose a CI training model		

Table 2.4 – CI specific analytical methods (Michaeli, 2013)

		Data Aggregation and Consolidation				Data Interpretation							Decision Support		
		Data Extrapolation	Identification of Relationships	Filling Data Gaps	Identification of Unknown Data	Identification of Recent and Future Competitors	Analysis of Industry Structure and Dynamics	Positioning Relative to Competitors	Assessment of Competitor's Intentions	Assessment of Competitor's Potentials	Identification of Business Opportunities and Threats	Development and Assessment of Hypotheses	Risk Assessment	Development of Competitive Strategies	Identification of an Optimal Decision Alternative
5.2 Basic Techniques	5.2.1 Timeline Analysis														
	5.2.2 Patent Analysis														
	5.2.3 Dynamic Regression Analysis														
	5.2.4 Competitor Process Simulation														
	5.2.5 Financial Analysis														
	5.2.6 Forecasting														
	5.2.7 Win/Loss Analysis														
	5.2.8 Data Mining														
	5.2.9 Text Mining														
	5.2.10 Competitor Profiling														
	5.2.11 Management Profiling														
	5.2.12 Benchmarking														
5.3 Model/theory-based Analysis	5.3.1 Technology Cycle Analysis														
	5.3.2 Trend Workshop (PEST)														
	5.3.3 Competitor's Strategy Analysis														
	5.3.4 Strategic Competitor Segmentation														
	5.3.5 Value Chain Analysis														
	5.3.6 Competitor Classification (Intention/Potential)														
	5.3.7 Cost Structure Analysis														
	5.3.8 Reengineering														
	5.3.9 Issues Management														
	5.3.10 Core Competence Analysis														
	5.3.11 5-Forces Industry Structure Analysis														
	5.3.12 Portfolio Techniques														
6.1 Decision Support	6.1.1 Scenario Techniques														
	6.1.2 System Dynamics														
	6.1.3 Early Warning														
	6.1.4 War Gaming/Simulation														
	6.1.5 Decision Analysis														
	6.1.6 SWOT-Analysis														
	6.1.7 Chances/Risk Analysis														
6.2 Hypothesis Selection	6.2.1 Game Theory														
	6.2.2 Blind Spot Analysis														
	6.2.3 ACH														
	6.2.4 Evidence-based Intelligence														

2.1.3. Scientific evolution milestones

Marcial (2018), Juhari & Stephens (2006), and Prescott (1996, 1999) synthesised the evolution of CI based on extant literature on the topic. Below we detail further and expand the key theoretical milestones timeline to this day:

- Before 1947 – Antecedents
 - Knowledge transfer on the importance of strategic information from the military doctrines and warfare (West, 2001), the founding of nation-states and empires (e.g., Sun Tzu c500 BC, Clausewitz, Kautilya (1915)), the English intelligence

impact on the 14th and 16th centuries British economy, and religious texts (conquest of Canaan) (Juhari & Stephens, 2006; Walle, 2001, p. 10).

- Alderson (1937) – claims that marketing intelligence is a responsibility of the marketing function.
- 1947-1959 – Origins and first steps focused on informal and tactical competitive data collection
 - Jones's (1947) article on scientific intelligence.
 - Platt's (1957) book on basic principles of strategic intelligence production as a field of activity and as a BoK.
 - Luhn (1958) introduces the concept of business intelligence
 - Alden & Campbell (1959) – edit a full book dedicated to CI as a “Special Report for Businessmen”. Based on 300 executive field interviews by nine students from Harvard Business School, it provides a very good definition of CI. Probably the birth of the CI discipline.
- 1960-1969 – Emergence of CI as a discipline
 - The pioneering intellectual foundations were published, and CI is linked to the rise of strategic planning.
 - Albaum (1962, 1964, 1967) argues for business intelligence development and illustrates the impacts focused on the quantity, accuracy and speed of information travelling between producers and users.
 - Guyton (1962) and Kelley (1965, 1968) expand on the gathering of marketing intelligence and establishing it as a function in organisations.
 - Greene (1966) – expands on the concepts of corporate, business, marketing intelligence, and intelligence systems in business.
 - Aguilar (1967) introduces the concept of environmental scanning.
 - Wilensky (1967) introduces the concept of organisational intelligence for private and public organisations.
 - Cox & Good (1967) on how to build a Marketing Intelligence System (MIS)
 - Pinkerton (1969) details a case study of establishing a marketing intelligence system in an organisation.
 - The CI concept expands to Japan and Europe – named “Veille” in France.
- 1970-1979 – expansion of the conceptual scope
 - Market the substantial increase of scientific production and the first education offerings in Sweden (Lund University) and France (Marseille).
 - King and Cleland (1974, 1975) expand on the intelligence system.
 - Wall (1974) brings a new focus on competition
 - Montgomery & Weinberg (1979) propose the strategic intelligence system (SIS)
- 1980-1989 – systematisation and structure of CI

- CI, as a much-needed distinct business function, gains a higher profile
- Porter (1980) – introduction of the vision of industry and competition.
- The Society of Competitive Intelligence Professionals (SCIP) was created in 1986; the first community focused on the profession.
- Porter and Millar (1980, 1985), Hax e Majluf (1984), Zinkhan & Gelb (1985), Tyson (1986), Vella & McGonagle (1987), Prescott & Smith (1987), Prescott & Grant (1988), Fuld (1988) – contribution on data collection and analysis.
- Fuld (1985) – publishes his seminal book revolutionising the CI field.
- Grabowski (1986), Gilad & Gilad (1988), Fuld (1988), Prescott e Smith (1989), Prescott (1989) – CI model (i.e., system, role and function) for organisations
- Martinet and Ribault (1988) – recover the conceptual delay with technological scanning (“veille technologique”).
- SCIP has circa 600 members by 1989.
- 1990-1999 – CI as a strategic asset for decision-making and competitive advantage, using qualitative and quantitative analysis
 - Berkowitz & Goodman (1989) reinforce intelligence as a strategic asset for the U.S. and build on the strategic intelligence concept.
 - The journal Competitive Intelligence Review was created in 1990 by SCIP
 - Dedijer (1990) introduces intelligence science as “the direction in which the intelligence corporation will grow.”
 - Baumard (1991), Jakobiak & Dou (1992), e Ribault (1992) share their “French” definitions of CI.
 - Mercyhurst University pioneered intelligence education with the launch of the US’s first Intelligence Studies program in 1992.
 - Harbulot (1992) and Martre (1994) introduce the “Intelligence Économique”.
 - Roukis, Conway & Charnov (1990), Ghoshal & Westney (1991), Prescott & Gibbons (1991, 1993), Fuld (1995) – CI gains a global dimension applied to international business development.
 - Fuld (1995) new book presents CI as a decision-support function and how to implement Corporate Intelligence Systems (CIS).
 - The Academy of Competitive Intelligence (ACI) was launched in 1996 as the first.
 - Fuld (1995), Kahaner (1997), Dutka (1998), McGonagle & Vella (1998), e Shaker e Gembicki (1999) introduce and reinforce the need for Counterintelligence.
 - SCIP has circa 6500 members (~11 times bigger) by 1999.
- After 2000 – advancement in the corporate and academe worlds.
 - The Brazilian Association of CI Analysts (ABRAIC) was created in 2000

- Puzzle – Spain, 2002; Journal of Competitive Intelligence – SCIP, 2003; Revista de Inteligência Competitiva – Brazil, 2011; scientific journals launched in this period.
- Institute for Competitive Intelligence (ICI) was launched in 2004 as a CI training program to become a certified Competitive Intelligence Professional.
- Michaeli (2005) publishes the book with the greatest impact on the German-speaking community and the base for the ICI curriculum.
- SCIP Chapters are set all around the US and the world: Dallas, Denver, Portugal, United Kingdom, France, Brazil, Poland, Israel, and Mumbai, to name a few.
- Fleisher, Wright, and Tindale (2007) register a significant increase in thesis and dissertations in the last of the three SCIP collations of CI literature.
- Prescott (1999), Serpa (2000), Cervantes (2004), Comai (2004), Jordan & Finkelstein (2005), Juhari & Stephens (2006), Goria (2006), Marcial (2007, 2013, 2014, 2018), Marcial & Suaiden (2016), Capuano et al. (2009) – represents some of the most relevant epistemological advances up to 2020.
- Osterwalder (2004,2010) brings a strategic dimension to business intelligence.
- Salles (2000), Negash (2004), Afolabi & Thiery (2005), and Dhaoui (2005) consolidate the conceptual strategic vision of CI.
- Solis (2010), Mirchevska & Markova (2011), DiMauro & Bulmer (2014), Liebana-Cabanillas et al. (2018) – the dawn of a new consumer paradigm: the social consumer.
- Social Intelligence Lab was created in 2018, a professional membership community focused on social listening and social intelligence practices.
- Jacobides et al. (2018), Teece (2018), Iansiti & Euchner (2018) – milestones in the understanding of the playing field (as ecosystems) and a new paradigm for competitive strategy.
- As the COVID-19 pandemic and war in Ukraine hit, a renewed interest in CI and strategic foresight emerged as organisations needed to adapt to a new world order.
- Gehl & Porter (2020), Sims (2022), Martin & Reeves (2022) – geopolitics and foresight practices related to CI are growing in interest.
- Cassie Kozyrkov was appointed as Google's Chief Data Scientist in 2018 to promote decision intelligence, a combination of Data Science (i.e., statistics, machine learning, AI, analytics) with Behavioural Sciences (i.e., psychology, neuroscience, economics, and managerial sciences).
- Bostrom (2014), Miorandi et al. (2014), Sturm et al. (2021), Pagani & Champion (2021), Paul et al. (2022), Knack et al. (2022), Dwivedi et al. (2023) – milestones in the way CI may create sustained value from augmented intelligence, namely from

machine superintelligence, artificial general (AGI), social collective intelligence (SCI) and human-centred artificial intelligence (HAI). This includes the emergent leveraging of general pre-trained transformers (GPT) technologies.

Given the increasing pace of change in the last two decades, a more granular approach to this later period of CI science development is an interesting path for future in-depth research.

2.1.4. Relation to other disciplines and sciences

CI as a science relates to a series of other disciplines such as information science (Borko, 1968), information technology (Olszak, 2014; Wright et al., 2013), computer science (Ben Sassi et al., 2015, 2022; Christian & Griffiths, 2016), data science (Xu et al., 2011; Berthold et al., 2020; Ranjan et al., 2021), knowledge management (Duvenage, 2013; Cavaller, 2014; Faz-Mendoza et al., 2020), future studies (Schwarz, 2007; Calof et al., 2015), national intelligence (Morrow, 2022), psychology (Heuer, 1999; Dhami et al., 2019), military theory, economics, and strategic management (Prescott & Miller, 2001; West, 2001; Fuld, 1985; Kelley, 1968), business administration, (Cekuls, 2022), marketing (Walle, 1999; Badr et al., 2004; Aly, 2022), strategy (Gilad, 2011), and international relations (Babbar & Rai, 1993; Muller, 2007; Nunes & Lequain, 2016; Tarek et al., 2017). CI posit as multidisciplinary at least or truly interdisciplinary at best (Marcial, 2018; Soilen, 2015).

2.2. CI EDUCATION

Prescott's article for the Encyclopedia of U.S. Intelligence on intelligence studies in business (ISB) is a good representation of the state-of-the-art of CI education (2014). A significant limitation to CI science legitimacy is the limited formal offer of education and research programs in the academe (SCIP, 2023; CI Fellows, 2023; IAFIE, 2023). Such educational offer relies on the development of relevant and thorough curricula. Current professors face almost inexistent textbooks available for developing a CI course. The existing competency framework provided a structure for developing not only textbooks but also syllabi, CI case studies, experience-based learning exercises, a core set of CI concepts, and a terminology (Prescott & Herko, 2009). However, two reasons derail the development of CI education, according to Soilen (2015). The first is that CI lacks a proper definition. This fact does not contribute to its general understanding, let alone the delimitation of the BoK that enables the curricula development and its teaching. The second is the wide scope of CI which is linked to an additional reason proposed by Prescott (2014) – CI falling behind in the red queen competition (Barnett, 2016), meaning the BoK is not evolving at sufficient speed to sustain or increase its relative status in academe. A concurring reason, in connection to the need for teaching materials, is limited CI research and publications in peer-reviewed journals. Here again, a scientific definition grounded in practice would bridge business and academia, allowing for better understanding, greater focus in teaching, and providing a research roadmap for CI.

2.3. CI PROFESSION

Several authors have tried to define the CI profession. According to Gilad, there are two prerequisites. The first is a “common BoK shared by the CI practitioners”. The second is a “unique set of tools, or the unique application of these tools” (Gilad & Herring, 2001). Jackson (2010) adds “professional association, cognitive base, institutionalised training, licensing, work autonomy, colleague control... (and) code of ethics”. Gilad and Soilen agree that CI has its own set of specific tools, namely for analysis, despite a wide common Bok with other related disciplines (Gilad & Herring, 2001; Soilen, 2015). CI possesses a “vibrant practitioner community” and several associations (e.g., SCIP or the CI Fellows), which also provide a code of ethics, although it lost some of the allure of former days (Prescott, 2014; Soilen, 2015). The road to academic acceptance needs to address three elements: differentiation, mobilisation and admittance. Academic acceptance will drive professional acceptance, which is the reason why it is so important for a field to develop close relationships with business schools and universities. Here again, the CI is bound to a scientific and recognised definition by all practitioners to differentiate the BoK.

3. COMPETITIVE INTELLIGENCE: A UNIFIED VIEW AND MODULAR DEFINITION

3.1. INTRODUCTION

“The beginning of wisdom is the definition of terms” (Socrates, 470–399 BC). A definition conveys the meaning of a word or term accurately and directly so that the addressees can understand it; this is an essential part of the argumentation and communication (Sterkenburg, 2003; Stoyko, 2009). “Competitive Intelligence” (CI) has been defined in hundreds of ways; however, existing CI definitions exhibit considerable polysemy and synonymy (Lopez-Robles et al., 2020). Polysemy implies that CI as a term is associated with two or more related meanings (Vicente & Falkum, 2017), while synonymy implies that it has the same meaning as other terms. Lopez-Robles et al. (2019) provided scientific evidence for these phenomena, highlighting as the most prominent examples of polysemy and synonymy vis-à-vis CI (Fuld, 1985; Munoz, 2017), business intelligence (Gilad & Gilad, 1985; McGonagle & Vella, 2012; Koseoglu et al., 2016; Lopez-Robles et al., 2019), market intelligence (Cipher, 2020; Kohli et al., 1993), marketing intelligence (Fleisher, 2008; McGonagle, 2016), economic intelligence (Juillet, 2006; Franco et al., 2011; Dou et al., 2018, 2019), and even environmental scanning (Oraee et al., 2020). Soilen (2015) and Hoppe (2015) also questioned and investigated whether CI is a scientific field, as “academics and professionals within these fields have been unable to agree on what dimensions, topics, or content are addressed by their field of interest.” The lack of agreement on a common definition, understanding, dimensions, themes, or content, as well as the considerable polysemy and synonymy in existing definitions, hinders the development of the CI discipline. Thus, theory development and testing of CI in academia, teaching and learning in education, and business practice are hindered.

In today’s volatile, uncertain, complex, and ambiguous business environment (Bennett & Lemoine, 2014), organisations compete at the ecosystem level (Iansiti & Euchner, 2018). Successful organisations must access, process, and respond to the sheer volume, velocity, and variety of big data (Laney, 2001). Big data are increasingly riddled with fake news and misinformation (Lazer et al., 2018), leading to higher levels of information overload (Edmunds & Morris, 2000; Eppler & Mengis, 2004; Saxena & Lamest, 2018). Moreover, a significant gap exists between the data considered critical to decision-making and the amount of data CEOs receive across all major categories. Most importantly, this gap has not narrowed over the past decade (PwC, 2019). Decision makers thus face more intensive challenges in terms of the quality of their decisions and strategies. Therefore, improving firm performance has become harder, as evidenced by the increasing turnover of CEOs (McGinn & Ignatius, 2016; CBInsights, 2019; ChallengerGray, 2020) and the declining lifespan of organisations (Foster & Kaplan, 2011). The goal of CI is to ensure organisational survival by improving and sustaining firm performance through an efficient decision-making (De Almeida et al., 2016; Lopez-Robles et al., 2019, 2020).

The inter- and multi-disciplinary nature of CI, coupled with the lack of a unified understanding and consensual definition, is underpinned by a highly dispersed body of knowledge (Soilen, 2015; Lopez-Robles et al., 2020). The central phase of scientific research is the systematic classification of different items in a domain or field. This classification is crucial for constructing new knowledge, especially in the early stages of a research process Field (Eppler & Stoyko, 2009) and is impossible without a clear definition of CI. Soilen (2020) attests to this fact by demonstrating that relabelling or “science-by-buzzwords,” that is, using many different terms to name an existing concept, does not advance science. The reason why CI is not able to establish itself as a science is owing to the lack of a unified definition that could delineate the body of knowledge.

Furthermore, CI research is biased towards the art of intelligence or intelligence as a practice (Hoppe, 2015). The result is a failure to answer research questions that would help us better understand what CI is and does, and more importantly, what impact CI has on science, education, society, and policy for the benefit of people and organisations (Wickert et al., 2020). Pursuing the latter avenue of research would lay the groundwork for establishing CI science.

The lack of a unified approach as a field of knowledge may explain the insufficient number of courses and curricular units in higher and executive education (Miller, 1994; Fleisher, 2004; Parker et al., 2008; Blenkhorn & Fleisher, 2013). Another explanation is that CI has been primarily driven by consultants rather than academics (Soilen, 2015). Consequently, only a few students have exposure to CI, resulting in lower awareness and practice. The barriers outlined hinder CI adoption in organisations, academic research, and CI education. Thus, the full impact potential of CI is under-researched and under-utilized in both business and academia. Therefore, exploring and defining what CI is and what it means is crucial for leaders, policymakers, researchers, students, and educators.

Scientists and leaders have been defining CI for over a century. Intelligence has been mentioned since the founding of nation-states and empires, such as in the Arthashastra, written by Kautilya in the 3rd century BC (Kautilya, 1915; Soilen, 2012, 2016; Shamsastry, 2016). Scholarly references go back to the business intelligence (Greene, 1966), marketing intelligence (Alderson, 1937), and CI (Alden & Campbell, 1959). The most recent definition known to the authors was given by Cavallo et al. (2020). CI has been defined as a process (Lutz & Bodendorf, 2020), a product (Lopez-Robles et al., 2020), a function (Garcia-Alsina et al., 2016; Maungwa & Fourie, 2018), a profession (Gilad & Herring, 2001; Lopez-Robles et al., 2019), a system (Cavallo et al., 2020), a tool (Du Toit, 2013), a program (Hedin et al., 2014; Purpura, 2019), a theory (Calof et al., 2015), a practice (Rothberg & Erickson, 2017), a skill (Markovich et al., 2019), a body of knowledge (Trim, 2001), body of knowing, body of practicing, body of acting (Brody, 2008; Wang & Borges, 2013), a discipline (Brody, 2008; Marcial & Suaide, 2016; Barnea, 2020), an art (Rouach & Santi, 2001; Wright & Calof, 2006; Gilad, 2020), and a science (Marcial & Suaide, 2016). Therefore, it is imperative to understand, define, and delineate this phenomenon and its dimensions, more than the different labels, in a unified approach that can be grasped by the majority of the stakeholders (Soilen, 2015). Attempts to define CI in extension are proving to be almost impossible, as with

any other multidisciplinary science. CI integrates many complex concepts that bring together several different ideas, or in other words, are themselves the integration of several other simple concepts (Stoyko, 2009). This conceptual cascade makes the development of a thorough definition too long, complicated to understand and communicate, and consequently irrelevant to scholarship and practice. Moreover, the usual strategy in creating definitions is to go back to the earliest uses of the word; however, according to Landau, “it is most useful to examine current meanings” (Brody, 2008). In their bibliometric review of the last 30 years’ intelligence models, Lopez-Robles et al. (2019) calls for new research to provide “a deeper examination of the field with a conceptual analysis of definitions, along with an identification of common elements shared among such definitions.” The authors also advocate “examining their points of interaction, complementarity, maturity, and their application to contemporary organisations, along with a definition of an integral model of intelligence.” Although researchers and practitioners have defined CI comprehensively, there is still no consensus on what CI and its constituent concepts are. Therefore, it is crucial to explore and advance a unified view of CI that aligns with the current zeitgeist and clarifies its meaning for both organisations and academia.

This study examines the most extensive corpus of definitions of CI and related concepts to date and proposes a thorough, concise, clear, consensual, and contemporary definition. Integrating complex concepts to shorten the definition of CI without losing accuracy and simple concepts to detail their specifics without losing overall context and meaning involves a modular approach. The identification of the core definition dimensions, and their descriptors will ultimately enable a unified view and definition regardless of the level of granularity sought. A broad but precise definition should enable an easy understanding of CI. A specific definition that is highly granular and precise should allow a thorough understanding of the intrinsic and specific properties of CI. A set of intermediate definitions should also reflect the interdisciplinary nature of CI and define the associated embedded concepts. Thus, the research objective is to propose a unified view and definition of CI by identifying and integrating its main defining dimensions and descriptors.

The main objective is to provide an integrative definition that can serve as a consensual reference and a cornerstone for future CI theorising, education, and practice, building on previous attempts such as by Bulger (2016). In addition, the authors expect to contribute significantly to resolving existing terminological misunderstandings within or between CI and related terms (e.g., business intelligence, competitor intelligence) and CI and related fields of knowledge (e.g., competitive strategy, strategic planning, market research).

It is expected that the results will broadly extend the CI theory. Existing contributions are limited to exploring mutually exclusive partial explanations for CI. By applying abductive theoretical reasoning, the authors expect to provide a unified view through an integrative approach that considers the multidimensionality of the CI concept. The study aims to go beyond these dimensions and identify the explanatory descriptors to provide a holistic view and understanding of the concept. Consequently, a broader framework offers new research topics and new ways to expand the theory. Defining the scope of CI and reducing or explaining its distinction from other fields of knowledge will advance interdisciplinary theory

development and testing while attracting new researchers to develop their investigations in the field of CI.

Given the multidisciplinary nature of CI, the results are expected to contribute to and extend theories from related disciplines (e.g., national intelligence, strategic management, and organisational sociology). Moreover, contributions are also expected to theories such as the knowledge-based view of the firm (Conner, 1991; Grant, 1996), competitive strategy (Porter, 2008), absorptive capacity (Cohen & Levinthal, 1990), dynamic capabilities (Teece, 2007), knowledge management (Nonaka, 2007) (Nonaka, 2007), and organisational learning (Argyris, 1977; Weick, 1979). The contributions arise from contextualising the integration and application of related disciplines in the scientific development, practice, and teaching of CI while clarifying their role in related theories and vice versa.

The study extends the research methods (e.g., sequential mixed-methods) and purposes (e.g., complementary, completeness, development, and confirmation) previously used; methods and techniques (e.g., Computer-Aided Text Analysis, Topic Modelling, and Analysis of Competing Hypotheses); sources (e.g., journal articles, industry reports, company and thought leader websites, dissertations); scope breadth and depth (i.e., knowledge areas, e.g., marketing intelligence); terms (e.g., knowledge management); perspectives (i.e., the definition of dimensions and descriptors); and size of the dataset (i.e., 412 publications and 816 definitions). Previous research on the meaning of CI (Wheaton and Beerbower, 2006; Brody, 2008; Breakspear, 2013; Pellissier and Nenzhelele, 2013a; Bartes, 2014) is predominantly qualitative, with only one previous reference using quantitative methods (Brody, 2008). The inherent subjectivity of qualitative methods may explain the existing high levels of polysemy and synonymy. The authors made meticulous efforts to increase the volume of publications and definitions corpora to get the most benefit from quantitative methods. This mixed-methods approach enables the derivation of meta-inferences that would otherwise be impossible (Venkatesh et al., 2016) and brings more objectivity and robustness. Thus, the results serve as a reliable cornerstone for the induction of a unified view and definition and contribute significantly to the field and science. The methodology aims to make empirical contributions to research and the scientific method.

As Wheaton and Beerbower (2006) state regarding the absence of a definition of intelligence: “The intelligence community literally doesn't know what it's doing.” This fact has been reiterated by several authors to date as the lack of a common understanding and, thus, “unstable boundaries” of the field (Haddadi et al., 2011; Pellissier & Nenzhelele, 2013a; Du Toit, 2015). A unified CI definition will undoubtedly provide a much-needed baseline reference for organisations and practitioners. Consequently, the CI profession will delineate its body of knowledge and guide the development and application of a unique set of tools (Gilad & Herring, 2001). The CI professional (CIP) is established by addressing the six attributes that characterise a profession's identity: 1) artefact, 2) definition, 3) body of principles, 4) body of practices, 5) professional responsibility (ethical and legal), and 6) durability (Zinn & Goldsby, 2014). These criteria are crucial to the successful establishment and operation of the CI function by determining its policies and structure. Defining CI and its role is paramount to gaining further attention and traction alongside business and education.

Understanding CI enables organisations and their leaders to explore and harness the potential of CI to form organisational decisions and strategies. It informs CIP about what to do, how to improve performance, and where to focus time and effort to improve the overall yield and effectiveness. Finally, defining CI enables educators to develop specific curricula for the classroom and raise awareness in the business community, creating a virtuous cycle for developing CI practices. As described above, the results are relevant to science, as well as education and business, while contributing to the five forms of scientific impact: scientific, practical, societal, political, and educational (Wickert et al., 2020).

The next section begins with a description of the materials and dataset, followed by a detailed explanation of how the mixed-methods approach was used, given its originality and apparent complexity. Later, the results derived from the application of each method and their overall integration are presented in parallel with their discussion and implications for the field of CI. The paper concludes with the main conclusions and future research opportunities.

3.2. MATERIALS & DATA SET

The data set for this study is based on several types of literature. It was collected after a thorough analysis and review of academic literature, including journal articles, books, book sections, dictionary and encyclopaedia entries, dissertations and theses, and conference proceedings. In addition, there were trade journal articles, reports and industry surveys, statutes, websites, manuscripts, and working papers reflecting first-hand professional experiences of CI thought leaders and the respective organisations. We reviewed 1290 publications, resulting in a publication corpus of 412 selected publications. These publications included definitions of CI or related terms in any form (lexical, extensional, intentional, sentential, controlled, and stipulative) (Geeraerts, 2003) or referred to any of the elements of the CI model (Pellissier & Nenzhelele, 2013b; Araujo et al., 2017; Oraee et al., 2020). The definition corpus consists of 816 unique definitions of concepts in the domain of CI and is, to our best knowledge, the most comprehensive dataset of its kind. Table 3.1 shows the composition of the two corpora in detail.

Table 3.1 – Data set overview: Publications, publication corpus, and definition corpus split by source

	SCIP BIBLIOGRAPHY ... - 2007	SCOPUS SEARCH 2007 - 2020	WEB	DICTIONARY	OTHER BACKWARD REFERENCES	TOTAL
PUBLICATIONS	993	272	21	4	222	1290
PUBLICATION CORPUS	114	51	21	4	222	412
DEFINITION CORPUS	212	127	56	4	417	816

Figure 3.1 shows the detailed breakdown of the definition corpus by publication type. The variety of publication types attests to the effort to ensure the representation of academic and professional sources and cover theoretical and empirical perspectives.

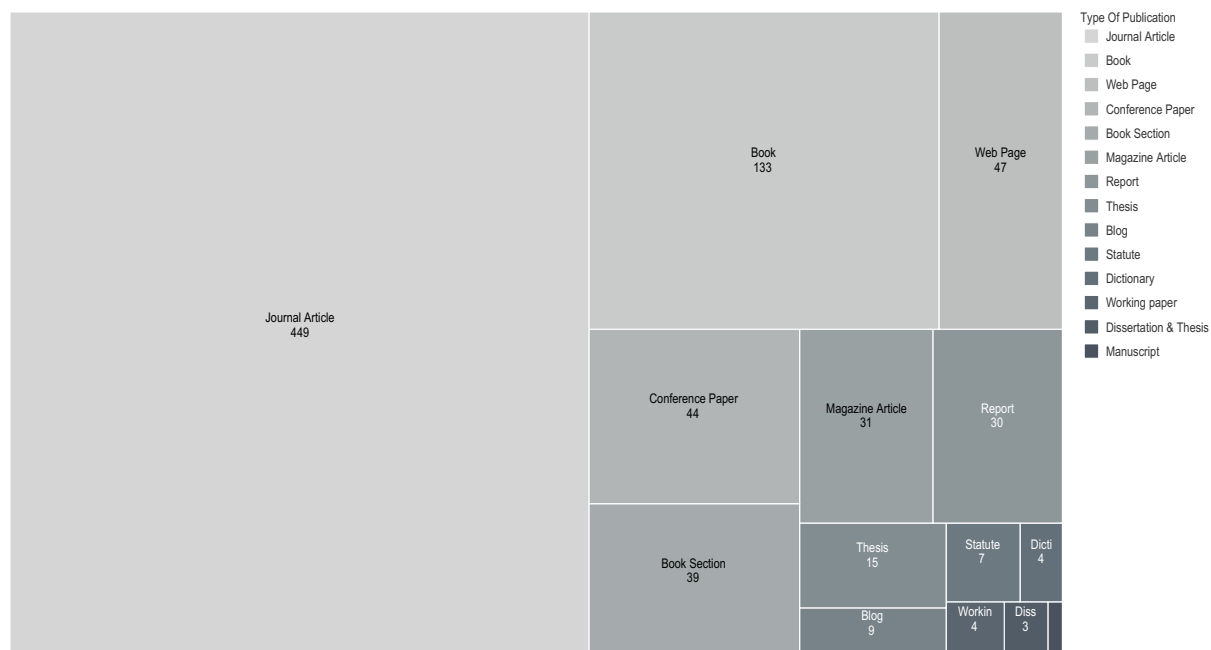


Figure 3.1 – Definition corpus split by type of publication

3.3. METHODOLOGY

Pragmatism (Venkatesh et al., 2016) is the research paradigm (Kuhn, 1962; Creswell, 2010; Lincoln & Guba, 2013; Mertens, 2014) that centres on the concepts and methods of the study. Ontologically, reality is assumed to be continuously interpreted. CI is defined according to the multiple interpretations that result from its usefulness in new situations, in different contexts, and over time. This approach highlights the importance of subjective meanings, emphasising the fact that understandings and perceptions serve to filter actual reality as well as the importance of objective facts. These understandings and perceptions can be transformed into numerical variables through quantitative methods such as Analysis of Competing Hypotheses (ACH) and Natural Language Processing (NLP). Epistemologically, this study starts from the premise that knowledge is constructed and based on the experienced reality of the world. Within this premise, different knowledge results from the different perspectives through which the engagement with truth occurs (Biesta, 2010). Axiologically, the perspective should be unbiased to achieve a balanced view that can serve as the broadest possible basis for future developments. Abductive reasoning is used as a theoretical reasoning (Bechara & Van de Ven, 2007) to combine data and theory (Feilzer,

2010, p. 10). Observations are transformed into views and then evaluated through actions (Morgan, 2007). Different approaches to theory and data allow conclusions developed from qualitative and quantitative research to be triangulated (Feilzer, 2010; Morgan, 2007).

The methodology is based on a sequential, partially mixed-methods approach (Venkatesh et al., 2013, 2016). Qualitative data collection using document analysis was employed to identify the publications containing definitions of CI and related terms. The initial selection focused on the Strategic and Competitive Intelligence Professionals (SCIP) bibliography (Dishman et al., 2003; Knip et al., 2003; Fleisher et al., 2003, 2007). Qualitative content analysis of the initial publication corpus enabled the identification of CI descriptors that supported the development of a working' controlled vocabulary (Prior, 2010). The most relevant descriptors served as keywords in the search string used in the Scopus database to identify and locate post-2007 publications. The resulting final publication corpus was subject to a second iteration of document analysis to extract the relevant definitions. The final definition corpus was derived by adding these definitions to those used by the authors in their research and professional activities over the past decade. Qualitative analysis was performed on the final definition corpus using content analysis to refine and transform the working' controlled vocabulary into a CI ontology. The primary purpose of this vocabulary of terms and associated definitions or rules (Uschold et al., 1998; Prior, 2010) is to serve as a basis for defining CI conceptual components while representing a common understanding of the field. In parallel, a quantitative analysis of the same corpus was used to identify the main defining dimensions of CI and the corresponding descriptors using NLP and topic extraction. The interpretation of the results facilitated by the CI ontology formed the basis for the hypotheses used in the ACH. This method, both a qualitative and quantitative scientific methodology, was used to 1) validate the hypotheses for the defining dimensions of CI and the corresponding descriptors and 2) find the evidence and arguments that confirm or refute the hypotheses. A mix of these methods increases the confidence and robustness of the results and compensates for both the subjectivity of the previous qualitative approaches and the potential lack of explanatory power of the quantitative approaches due to the multidisciplinary complexity of the topic.

The final step is the qualitative analysis and integration of the results (the validated defining dimensions and the corresponding descriptors) by inductively developing a unified definition for CI. In this step, the key meta-inferences, "the theoretical propositions, narratives, or a

study derived from an integration of findings from quantitative and qualitative strands of mixed methods research” (Venkatesh et al., 2013, p. 29), were derived.

3.3.1. SCIP bibliography as CI’s foundational body of knowledge

In a departure from the “standing on the shoulders of giants” approach (Oraee et al., 2020), the SCIP bibliography, considered an early reference for the CI body of knowledge, is used. It comprises 993 references compiled by Knip, Fleisher, and Dishman (2003) for the writings until 2003 and by Fleisher, Wright, and Tindale (2007) for the period between 2003 and 2007.

3.3.2. Thesaurus, controlled vocabulary, and ontology for future classification and interpretation

This literature review supported the development of a list of terms – authorised descriptors – that were used to create a controlled vocabulary of semantically and generically related terms that cover the specific knowledge domain of CI. The resulting thesaurus enabled the identification of hierarchical (broader, narrower), synonymous, and other related terms and the development of a scope notation. Most importantly, it provided clarification for the meaning of terms, guidance on their use, an aid to future indexing, and served as a basis for the future classification of definition corpus and the development of an ontology. The famous glossary of Vernon Prior entitled “The Language of Competitive Intelligence,” published in a four-part series at Competitive Intelligence Review and subsequent updates, served as the cornerstone of this effort (Prior, 1998a, 1998b, 1998c, 1999, 2010).

3.3.3. Search strategy & keywords: identifying relevant publications with CI definitions from 2007

Controlled vocabulary was used to carefully select keywords and guide the search for additional publications, including CI definitions from 2007. Elsevier’s Scopus, the world’s largest abstract and citation database for peer-reviewed literature with over 75 million records containing 24,600 titles from more than 5,000 international publishers (Elsevier, 2020), was chosen to identify such relevant publications. The search string is composed of keywords encompassing the different nomenclatures of intelligence, its components, practices and related knowledge domains, and associated terms from the thesaurus, filtered by the presence of the term definition (or derivatives) within three words.

3.3.4. Definition corpus development

The starting point of the search was a set of 1,290 publications, obtained by adding the 993 references from the SCIP bibliography with the 272 Scopus results. Using the previously developed thesaurus, a thorough analysis to identify publications with definitions of CI or related terms resulted in a corpus of 165 publications. The authors supplemented the corpus in two ways. First, by tracing 222 backreferences used in the definitions. Second, adding the authors' definitions from their CI research and practice over a decade, including the most recent 21 web references from industry thought leaders and four dictionary entries. The final publications corpus included a total of 412 references. The selected definitions were then extracted and compiled in MS Excel to form the final definition corpus with 816 entries (see Table 3.1 for a detailed overview).

3.3.5. Topic modelling: identifying CI defining dimensions and descriptors

Quantitatively Computer-Aided Text Analysis (CATA) using a Bayesian unsupervised statistical machine learning technique known as topic modelling allows us to infer which topics best characterise the word distribution within the definition corpus. The process begins by identifying topics as vectors of words, weighted by their importance in a given topic. This form of probabilistic modelling can be applied to the observed data to estimate the structure of the underlying hidden data-generating process (Blei et al., 2003; Blei, 2012; Gentzkow et al., 2019). Topic generation and word weights are independent of meaning, order, and date of definitions. Each topic is treated as a “bag of words”, with the only criterion being the presence of the words in the definition. The model identifies the hypothetical thematic structure that generated these definitions. The underlying premise is that topic models are a deliberate mixture of topics, and each topic has an associated probability distribution over words. Topic modelling specifies the probabilistic technique for generating a particular document by choosing a distribution over topics. Then, for each term in that document, a random topic corresponding to that distribution is determined, and a word is selected from that topic. The direction of this generative process can be inverted and used to derive the set of topics that produced a collection of documents (Steyvers et al., 2007), the necessary intermediate goal to ensure the completeness and relevance of the new unified definition.

The simplest and most commonly used topic model is called the Latent Dirichlet Allocation (LDA) model (Blei et al., 2003) and can be viewed as a type of Principal Component Analysis. LDA is a generative unsupervised probabilistic model that discovers the top K topics in a text

dataset and describes them using the most relevant N words. The observed data present in the definition corpus is a set of N unique words called tokens. The output of the topic model are two matrices: 1) K topic vectors, whose elements are the weights of the N tokens, representing the probability that the token belongs to each definition, conditional on the topic contributing to that same definition; and 2) distribution of topics over definitions, where each element of the matrix represents the probability that each tokened topic contributes to that specific definition.

To conduct the Topic Extraction, the authors chose KNIME, “a modular environment that allows easy visual assembly and interactive execution of a data pipeline” (Berthold et al., 2008). The critical steps in NLP included reading the compiled definition corpus from an MS Excel file, document generation, its pre-processing, and finally, topic extraction. Particularly in the pre-processing phase, part-of-speech tagging, lemmatisation, document cleaning (deletion of punctuation marks, number filtering, filtering of three-character words, removal of stop words, and conversion to lowercase), filtering of rare terms (words that occur less than twice), and filtering only for nouns, verbs, and adjectives were performed. Lemmatisation was preferred over stemming (Manning et al., 2008) to allow for better distinction between words and their meanings. This is crucial for developing a more accurate definition of CI, given the complexity and similarity of the terms analysed.

Since the topic extraction uses an implementation of the LDA model, the user must specify the number of extracted topics beforehand. The KNIME topic extractor node used in this process integrates the “MALLET: A Machine Learning for Language Toolkit” topic modelling library (McCallum, 2002), and it required the configuration of several settings. The first computes the optimal number of K topics to extract—the number of the core defining dimensions—using the “Elbow Method” (Tibshirani et al., 2001). The chosen method performs k-means clustering on the input data for a range of values of the number of clusters k (e.g., from 1 to 20). Then it calculates the for each k value, which is the sum of the distances of all data points to their respective cluster centres. The SSE values for each k were plotted on a scatter plot as a function of the number of clusters (Figure 3.2). The optimal number of clusters reflects the highest drop in SSE value. The resulting angle in the plot is five, the final value for this setting. The second setting is the number of representative words that best describe each topic and was set to twenty. The third set of settings is the values for alpha (α) and beta (β) in the a priori distributions. Since there is no theory-based method for selecting

the best, we used the recommended values for $\alpha=0.01$ and $\beta=0.001$. The fourth setting is the number of iterations, which was set to 1,000. Finally, the value for the parallel threads setting was set to 1.

3.3.6. Analysis of Competing Hypotheses

The ACH focused on testing the hypothesis for the core defining dimensions. The ACH is an eight-step procedure based on fundamental insights from cognitive psychology, decision analysis, and the scientific method. It is a surprisingly effective, proven process that helps analysts avoid common analytical pitfalls. Because of its thoroughness, it is especially useful for controversial issues when analysts want to leave an audit trail to show “what they considered and how they arrived at their judgment,” as stated in Heuer's (1999) seminal book *Psychology of Intelligence Analysis*. ACH breaks down a complex problem into its component parts. Thus, the starting point for ACH is hypothesis generation. For this study, the hypotheses are derived from the outcome of topic extraction—the core defining dimensions. The ontology enabled the provision of meaning to the results of topic extraction. Therefore, we tested the hypothesis that CI-defining dimensions can be identified by analysing the existing definitions in the relevant literature using the following sub-hypotheses:

- H1: Process is a core defining dimension of CI,
- H2: Purview is a core defining dimension of CI,
- H3: Product is a core defining dimension of CI,
- H4: Purpose is a core defining dimension of CI,
- H5: Practice is a core defining dimension of CI.

Developing a matrix of evidence and arguments that support or refute the various sub-hypotheses involves evaluating how each element or argument provides such evidence. The process consists of analysing the content of each definition, individually and across the previously identified defining dimensions and descriptors. The functional ontology supported the basic assumptions, logical deductions, and conclusions, which were compared for inconsistencies. Sensitivity analysis considered how conclusions would be affected if crucial evidence or arguments were false, misleading, or interpreted differently. A double-check of the validity of the critical evidence and arguments driving the results of the analysis was then performed. The conclusions are discussed in the results and discussion sections of this study.

3.3.7. Development of a unified view on CI: proposed definition

The confirmed hypotheses (CI's key defining dimensions and the corresponding descriptors) were integrated into a unified view and comprehensive definition. Ontology supported this inferential process. The integration, based on inductive reasoning, grouped the descriptors into increasingly complex concepts. This grouping allowed for more precise and accurate definitions without losing meaning. Conversely, decomposing complex concepts into simpler ones allows for a more precise but inherently longer definition of CI. The result is the proposed “modular” definition of CI. The resulting meta-inferences were only possible through the mixed-methods approach adopted for this study.

3.4. RESULTS & DISCUSSION

We expected to identify CI's core defining dimensions and corresponding descriptors to synthesise a unified view and modular definition. The main outcome of the first strand was the development of an ontology for CI. In short, it enabled the identification of key terms, their meanings, and the relationships between them. The result of the second strand, the quantitative method topic extraction, is identifying five core defining dimensions, represented by twenty descriptors and their respective weights on each dimension. The inductive inference process to synthesise the meaning of the descriptors allowed the identification and naming of each defining dimension. The third strand confirmed all sub-hypotheses identified through core dimensions using the ACH method. The meta-inferences from the results of these three strands provided a thorough answer to the research question of this study: a unified view and a modular definition of CI. The unified view of CI results from the inductive integration of the descriptors in the core defining dimensions. The modular definition results from the deductive deconstruction of the CI concept. Both the inductive and deductive inference processes were supported by the previously developed ontology. The machine-guided inductive, exploratory identification of descriptors and the human-guided deductive explanatory identification of dimensions, both supported by the literature-based ontology, matched perfectly. In summary, the main findings are as follows: 1) the optimal number of the core defining dimensions is five; 2) the twenty descriptors for each dimension were identified; 3) the research question and the exploratory five core defining dimensions were identified, named, and confirmed; resulting in 4) a unified view and modular definition for CI.

3.4.1. Number of the core defining dimensions

The Elbow Method was used to calculate the optimal number of clusters for topic extraction. The result is the unique identification of five core defining dimensions, corresponding to the number of clusters where the sum of squared errors (within clusters) designs the “elbow” shape, as shown in Figure 3.2.

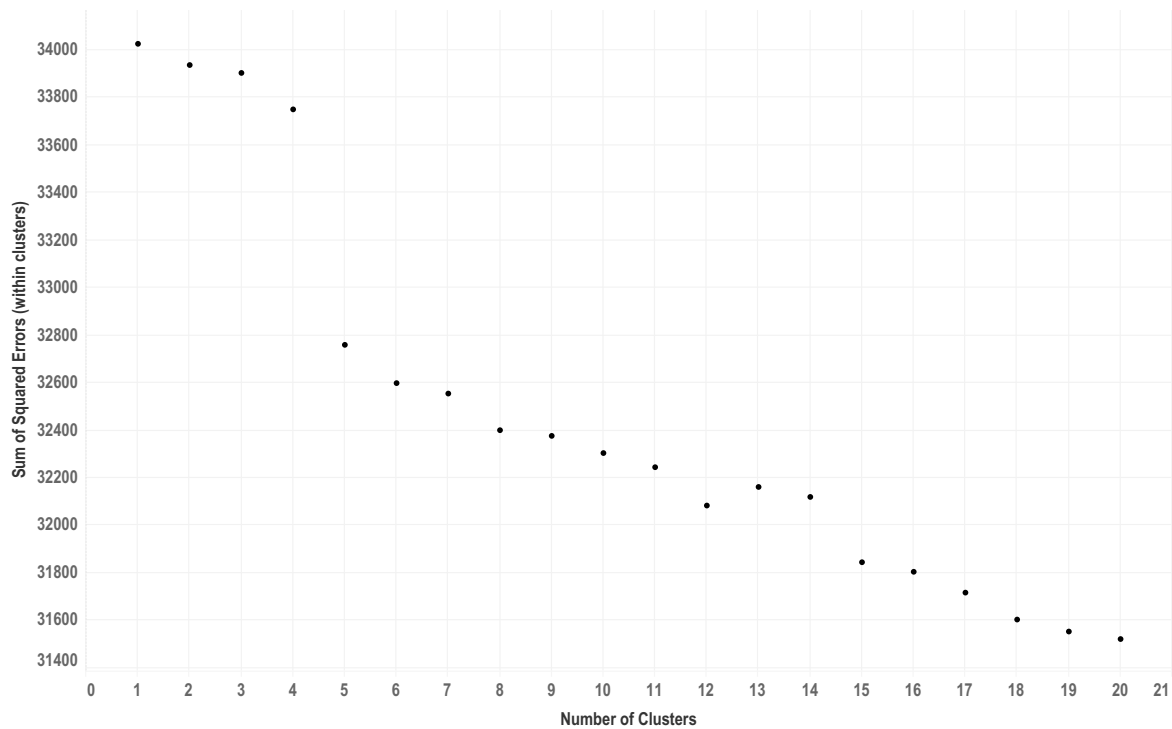


Figure 3.2 – Scatter plot of the Elbow Method - five clusters as the optimal number of the core defining dimensions

Figure 3.3 shows how the topic extraction technique maps each of the 816 definitions from the definition corpus to the five optimal topics computed by core defining dimensions using the Elbow Method. The top row highlights Topic 0 (Process) as the most prominent, followed by Topics 4 (Purview) and 2 (Product), and last by Topics 1 (Purpose) and 3 (Practices). This result could explain why the adoption of CI is low, as only about 15% (126 out of 816) of the definitions are assigned to Purpose. No business executive or academic will invest their time without understanding the purpose of CI. The columns represent the weighting of each dimension in the set of assigned definitions to each core defining dimension. In other words, since each definition addresses multiple dimensions to explain the meaning of CI, each column highlights the weight given to each dimension in a set of definitions that mainly explain one of the dimensions. As expected, the diagonal from the second row to the last row shows the highest weights, indicating that the definitions have been correctly assigned to

the dimension they mainly explain. However, it is also clear that the definitions usually focus on one or two, at most three dimensions, indicating the lack of explanatory power of the CI meaning (see Table 3.2 for more details on this issue). In our understanding, this fact underlines the need for a broad and precise definition of CI, the aim of this study. Finally, although topic 0 – the Process dimension – Is the most represented with the highest number of assigned definitions (282 out of 816), it loses representativeness in the total sum compared to all other dimensions (260 out of 816). This means that the Process dimension is usually addressed along with the other dimensions when defining what CI is. The other dimensions are usually used to explain CI in more focused definitions.

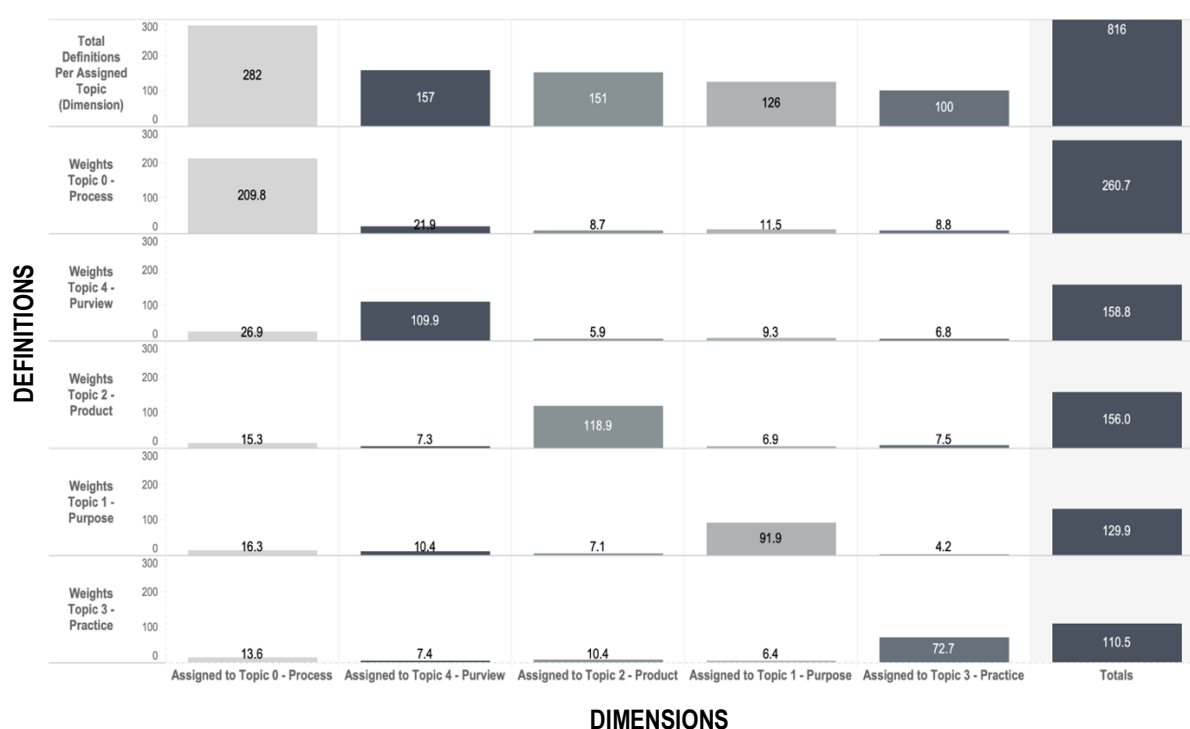


Figure 3.3 – Number of definitions and respective weights per dimension (assigned to topic)

3.4.2. Descriptors of the core defining dimensions

Based on the five optimal clusters, the topic extraction method identified 20 terms (descriptors) for each of the assigned topics (defining dimensions). The assigned descriptors follow their respective weights on the definition corpus for each defining dimension.

3.4.3. Validation of hypotheses and identification of the core defining dimensions

ACH and CI ontology were applied next to test the validity of the main research question and its sub-hypotheses. As the hypotheses resulted from the topic extraction method and were

thus mathematically validated, the validation focused on ensuring that the resulting terms were understandable. In addition, this process enabled identifying and naming each of the core defining dimensions. The verification of each sub-hypothesis is discussed in detail below¹.

H1: Process as a core defining dimension of CI

Topic_0 confirms H1. Figure 3.4 shows the key descriptors and their respective weights for the CI Process as a core defining dimension. The terms assigned to this topic with the highest weights, namely intelligence (1131), information (825), and competitive (680), highlight the CI Process (601) as the most relevant defining dimension for CI. The rest of the terms encapsulate the Intelligence Cycle and the intelligence development process and refer to the collection (152), analysis (209), and decision (265) phases. The characteristics of the CI Process emphasise its importance to strategic (274) decision-making (141), the need to be systematic (130), to make its output actionable (131), and to be a knowledge (135) and information management (174) activity, focusing on the business (499) environment (340, 129) in which the company (154) and its competitor(s) (141) play, while covering both the external (164) and organisational (232) perspectives.

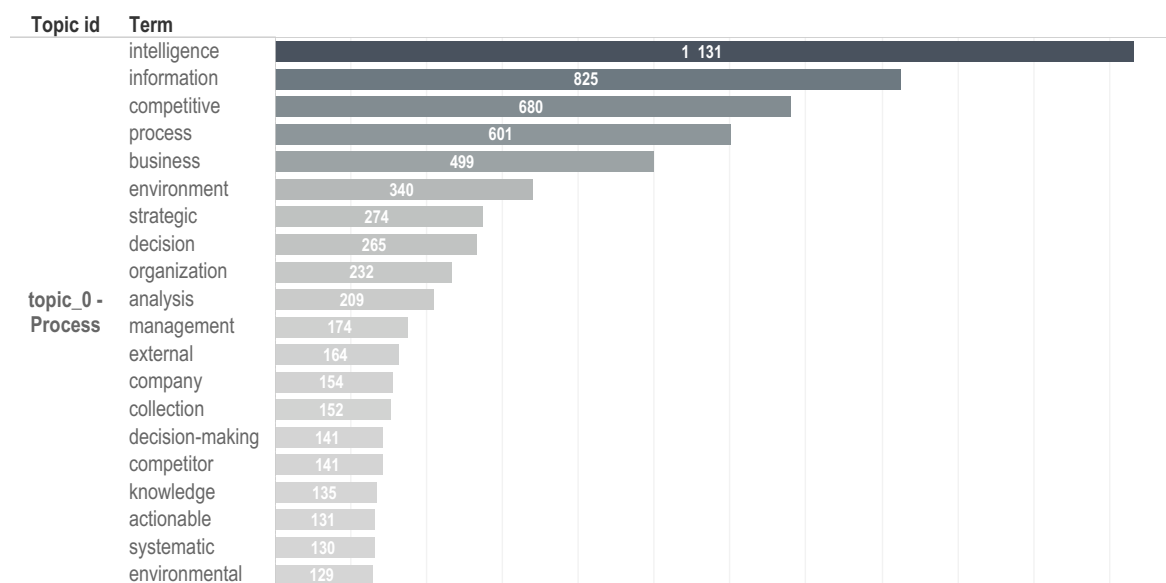


Figure 3.4 – Process core defining dimension descriptors and respective weights

The three definitions that best illustrate this topic_0 – CI Process are those by Calof and Skinner (1998), Diffenbach (1983), and Oraee et al. (2020), where the probabilities of each

¹ Three critical notes for reading this section are as follows: 1) italics highlight key terms; 2) round brackets “()” are used for convenience to refer to the weighting of each term; and 3) terms are in their lemma version.

definition belonging to this topic are ~0.998, ~0.997, and ~0.996, respectively. The transcript for the most representative definition is as follows: “Competitive Intelligence is a systematic program ...to find new opportunities and remain competitive. CI can be defined as actionable recommendations resulting from a systematic process that involves planning, collecting, analysing, and disseminating information about the external environment with respect to opportunities or developments that may affect the competitive situation of a company or country. CI is proactive, with the intention of predicting what will happen ...; involves analysing information, not just finding and applying best judgment; a systematic process for gathering information and recognises that the most valuable information is available internally; ethical; involves targeted deep sources of information, CI is extremely detailed; involves a multi-step process called the CI wheel that includes defining intelligence needs and planning the intelligence project, gathering data, analysing data, and disseminating intelligence, ... which helps shape the decision.”

H2: Purview as a core defining dimension of CI

Topic_4 confirms H2. The key descriptors for the CI Purview as a core defining dimension, according to Figure 3.5, are primarily the components of a company's (173) ecosystem. These terms delineate the domain in which opportunities (88) for developing (85) competitive (94) advantages are identified (92) and strategised (158). The supporting capability (96) for the development (85) of intelligence (308) is derived from the analysis (115) of data (87) on the changing (120) external and internal factors. The external factors include the macro, meso, and microenvironments, while the internal factors cover the environment of the company (181). The macro-environment includes political, economic, social, technological (84), and legal factors. The meso-environment addresses the market (303). The microenvironment addresses the customer (228), product (188), industry (130), and competitors (434) to which the company belongs. Intelligence (308) developed (87) from these overlapping domains leads to many intelligence concepts, such as competitor intelligence, market intelligence, business intelligence, and marketing intelligence, to name a few. Referring to our literature review, the existing gap in addressing the purview as a core defining dimension prior to this study may explain the confusion around the concept and meaning of CI and the current levels of polysemy and synonymy definitions analysed. This fact adds to the originality and contribution of this study by delineating the body of knowledge and supporting the evolution of CI from a mere practice to a science.

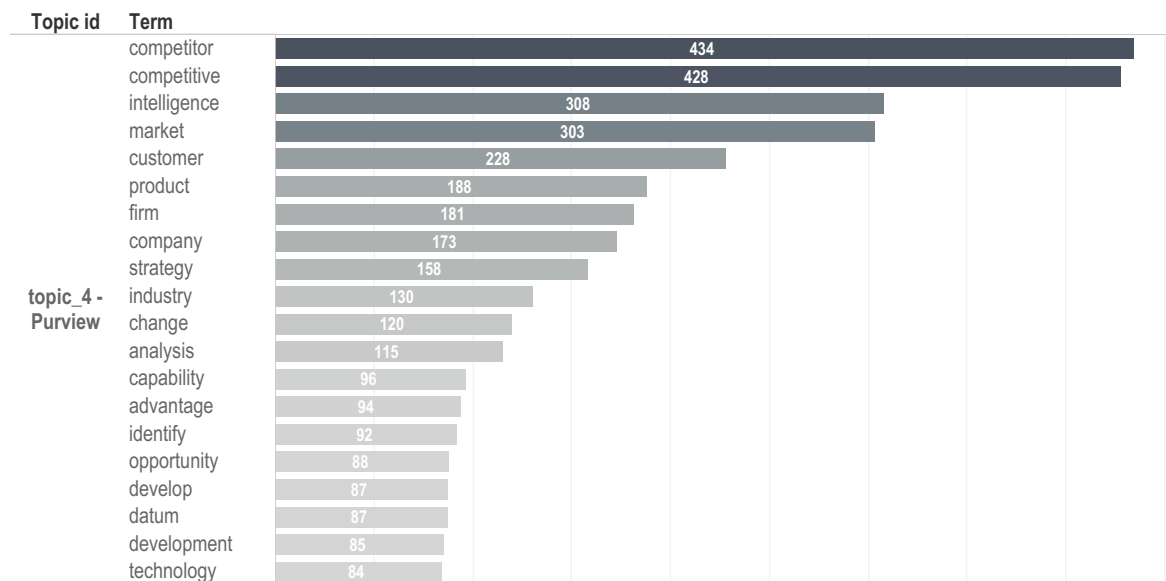


Figure 3.5 – Purview core defining dimension descriptors and respective weights

The three definitions that best illustrate topic_4 – CI Purview are those by Sigalas et al. (2013), Du Toit (2013), and Prescott (1999). The probabilities for each definition belonging to this topic are ~0.994, ~0.994, and ~0.992, respectively. Therefore, the most representative definition is “Competitive Advantage (Stipulative Definition) ... exploiting market opportunities and neutralising competitive threats above the industry average. Competitive Advantage (Operational Definition) ... the above industry average exploitation of a) all market opportunities and b) complete (exploitation of) the market opportunities; neutralisation of a) all competitive threats, b) complete (neutralisation of) the competitive threats. (Measured by) ... firms that have a higher level of competition than the industry average is assumed to have a competitive advantage.”

H3: Product as a core defining dimension of CI

Topic_2 confirms H3. Figure 3.6 shows the main descriptors and their weights for CI Product as the core defining dimension. The term with the highest weighting, knowledge (571), reveals the ultimate output of CI. Its emergence (57) results from the verification of knowledge gained from understanding information (139), which, in turn, is a product of data (283, 131) processing (136). The various stages along the way to knowledge and wisdom are an almost obvious connection with the Wisdom Pyramid (Ackoff, 1999). The nature of this product can be either human (83) or artificial, using machine (72) and deep learning (55) models (49), such as convolutional networks (60). The application (49) of knowledge as an organisational (52) asset (57) to create (67) value (68) also provides an explicit link with the knowledge-based view of the firm (Conner, 1991, p. 199) and the absorptive capacity (Cohen

& Levinthal, 1990) and organisational learning (Duncan & Weiss, 1979) theories of knowledge management (93) and learning organisation (50) (152).

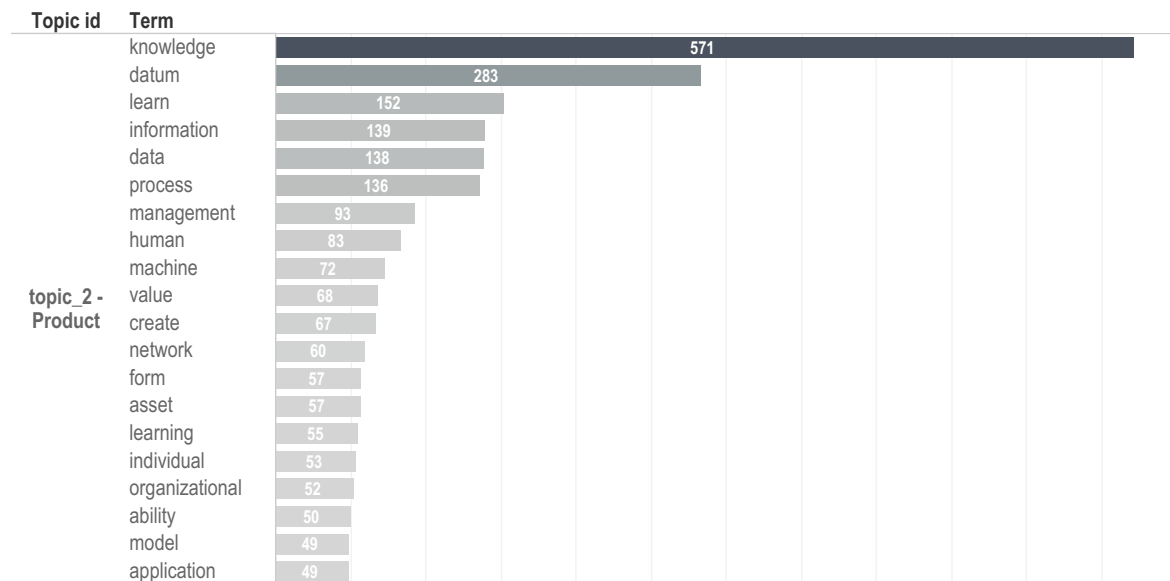


Figure 3.6 – Product core defining dimension descriptors and respective weights

The three definitions that best illustrate this Topic_2 – Product are those by ODSC (2020), Kurtti et al. (2013) and Hair (2007), where the probability that all these definitions belong to this topic is ~0.995. The transcript for the most representative definition is as follows: “Graph Database uses graph theory to store, map, and query relationships of data elements. Essentially, a graph database is a collection of what are called nodes and edges. A node represents an entity, such as a product or customer, while an edge represents a connection or relationship between two nodes. Each node contained in a graph database is defined by a unique identifier, a set of outgoing and/or incoming edges, and a set of key/value pairs. Each edge is defined by a unique identifier, a starting and/or ending node, and a set of properties. Graph databases are well suited for analysing relationships.”

H4: Purpose as a core defining dimension of CI

Topic_3 confirms H4. Figure 3.7 shows the key descriptors and their weights for the CI Product as the core defining dimension. Neglecting the obvious goal (42) of producing intelligence (299) from information (295) and datum (53), the terms assigned to this topic emphasise the purpose of CI as a decision (114) support (77) system (223). This means that CI is the ability of a particular agent, whether artificial or human, to identify and process signals and data from the external and internal environment to support the achievement of a

particular goal. In practice, this means a function or setting up management or marketing information systems to successfully guide the organisation towards its desired goals.

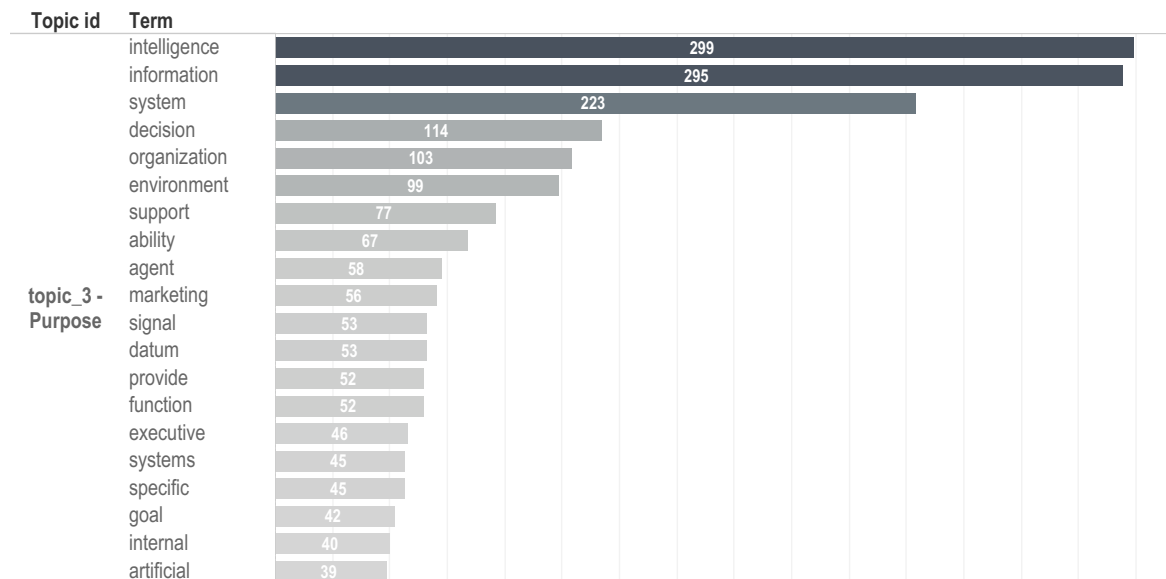


Figure 3.7 – Purpose core defining dimension descriptors and respective weights

The three definitions that best illustrate Topic_3 – Purpose are those by Legg and Hutter (2007), Wirth (2018), and Fuld+Co. (2018), where the probabilities of these definitions belonging to this Topic are ~0.998, ~0.992, and ~0.989, respectively. The transcript of the most representative definition is as follows: “Intelligence involves a confusing mix of concepts. ... Measures an agent’s ability to achieve goals in a wide range of environments. ... three essential components: an agent, environments, and goals. Clearly, the agent and the environment must be able to interact with each other, i.e., the agent must be able to send signals to the environment and receive signals from the environment. Similarly, the environment must be able to receive and send signals to the agent. Take the agent’s perspective on this communication and label the signals sent from the agent to the environment as actions and the signals sent from the environment to the agent as perceptions.”

H5: Practice as a core defining dimension of CI

Topic_1 confirms H5. Figure 3.8 shows the key descriptors and their weights, and they define CI as a set of forward-looking practices. These derive from organisational (51) activities (69) that include research (101) and analysis (83) to support decisions (51) that inform future (93) oriented short-, medium-, and long-term (93) strategies (48) and planning (64). Examples of such practices include strategic (177), business (112), and corporate (51) intelligence (484),

marketing (71), research (101), futures (93), strategic (177) foresight (77), sales (45) forecasting (61), information (55) management (65), and scenario (49) planning (48).

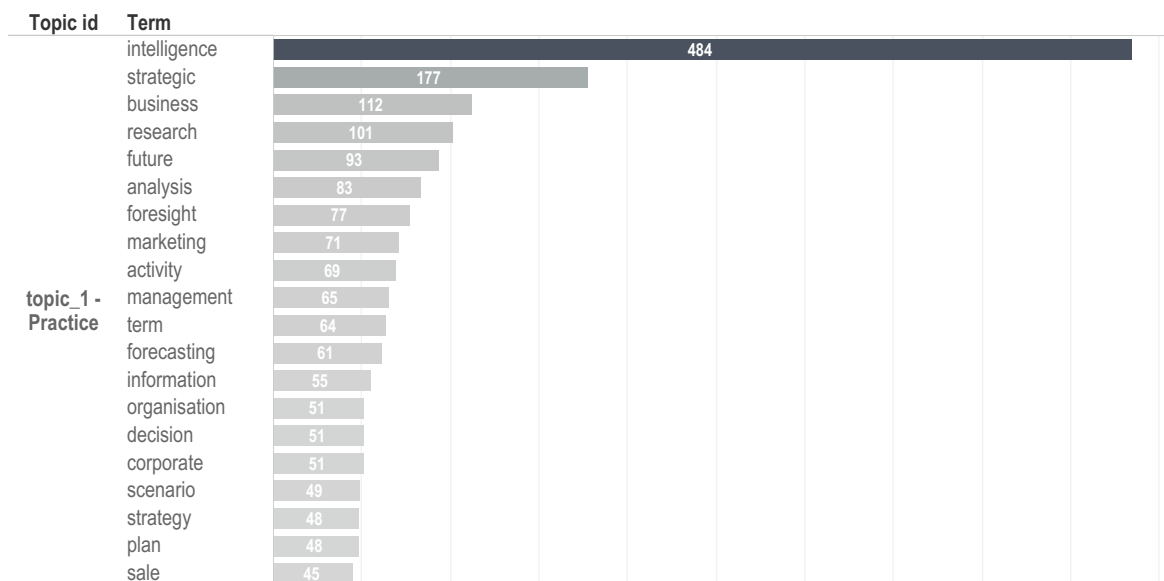


Figure 3.8 – Practice core defining dimension descriptors and respective weights

The three definitions that best illustrate Topic_1 – Practice are those by McGregor (2011), Andresen and Bergdolt (2017), and Pereira et al. (2020), where the probabilities of these definitions belonging to this Topic are ~0.994, ~0.99, and ~0.989, respectively. The transcript of the most representative definition is as follows: “Business Intelligence results from the consideration of integrated data that leads to useful information on which to base strategic decisions ... through the process of integrating Consumer Intelligence, gained from integrating data about the market, people gain consumer acumen. ... Gathers through consumer acumen. Consumer acumen underscores the need for people to understand how their actions and behaviours related to financial management affect their decision-making as consumers and how this, in turn, affects financial outcomes for individuals and families.”

3.4.4. Meta-inferences: induction of the unified view and modular definition

The results of the previous sections enabled the induction of meta-inferences to support the development of a unified view and modular definition for CI. The synthesis of CIs core defining dimensions led to the following overarching definition: CI is the process and forward-looking practices used in producing knowledge about the competitive environment to improve organisational performance. This definition aims to provide a summary and an accurate overview of the concept. The top-down approach to defining CI can be extended to provide increasingly precise definitions. The reverse process, synthesis of key descriptors,

provides a more detailed bottom-up approach to defining CI and related concepts. Figure 3.9 summarises the overall process supported by the working ontology.

3.4.4.1. CI unified view and modular definition

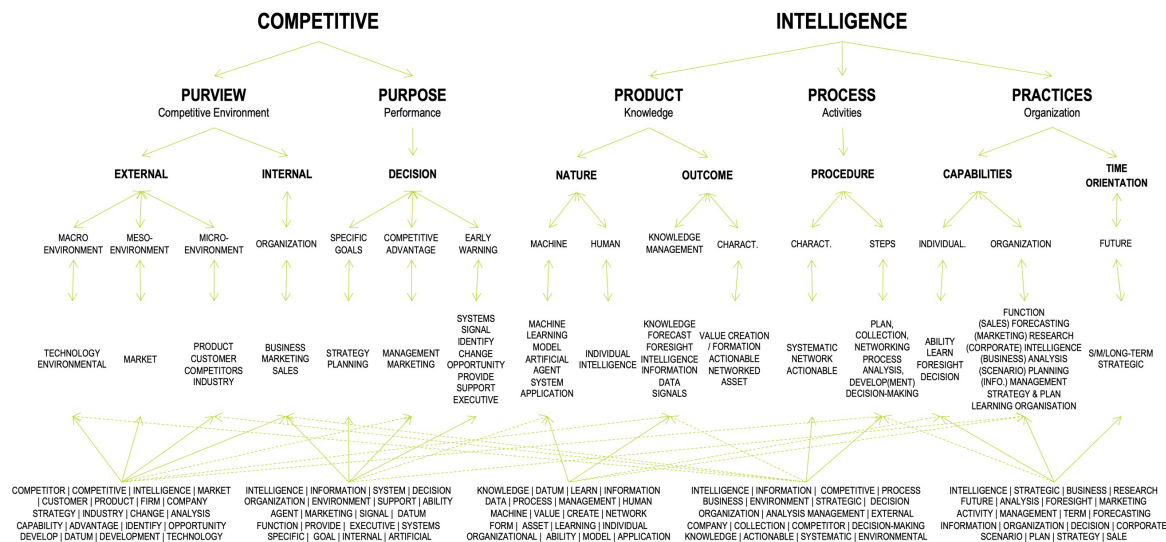


Figure 3.9 – Modular definition and top-down and bottom-up meta-inferences development process

The modular approach to defining CI can be understood by reading the schema vertically and horizontally. The horizontal reading allows for more precise and increasingly comprehensive definitions of CI. The definition presented in the previous paragraph at the core defining dimension level is the shortest and most comprehensive. However, a much more comprehensive definition can be derived from the next horizontal level of concepts: CI is the process that drives a set of activities enabled by capabilities that support predictive organisational practices to produce machine- and human-driven characteristic knowledge management about external and internal competitive environments, with the goal of supporting performance-based decision making. Vertical reading provides an in-depth explanation of each dimension. Since it is important to thoroughly understand the various dimensions of CI to grasp the integrated concept, a detailed explanation follows. Nevertheless, it must be highlighted that the integration of the dimensions yields more than their mere sum. The explanatory complementarity between the dimensions may explain why it has been so difficult to reach a consensus in defining CI.

3.4.4.2. CI process dimension modular components

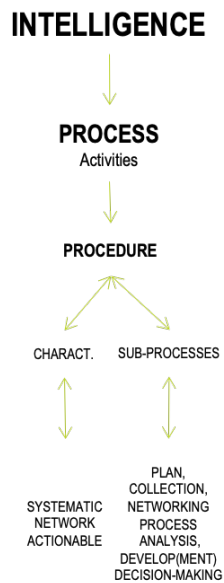


Figure 3.10 – CI Process core defining dimension detail

Beginning with the most prominent dimension, the CI Process is a series of activities that follow a procedure with certain characteristics and sub-processes. It is systematic (methodical), networked (a collective exercise rather than an individual affair), and actionable (not an end, but as part of the overall process that makes an organisation competitive). It is worth highlighting that the sub-process of identifying intelligence needs, usually one of the first processes, does not appear in the top keywords. This may be due to two factors: 1) words with three or fewer letters are eliminated during text preparation for the topic extraction; 2) intelligence needs are often referred to as Key Intelligence Topics and Questions (KITs and KIQs), which would exclude them from this analysis. The rest of the subprocesses are well-known and established in any intelligence development discipline.

3.4.4.3. CI Purview dimension modular components

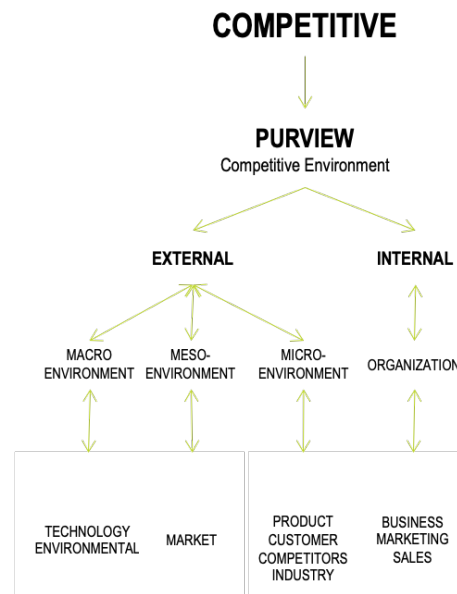


Figure 3.11 – CI Purview core defining dimension detail

CI Purview covers the entire competitive environment. The external environment addresses the macro environment forces in general, which affect the meso market geographies in which the organisation operates and influences the micro industry forces and actors, such as customers and consumers, suppliers, competitors, complements, substitutes, and the other stakeholders. The internal environment is also the subject of intelligence development to improve the performance of the organisation’s functions with already available data.

3.4.4.4. CI Product dimension modular components

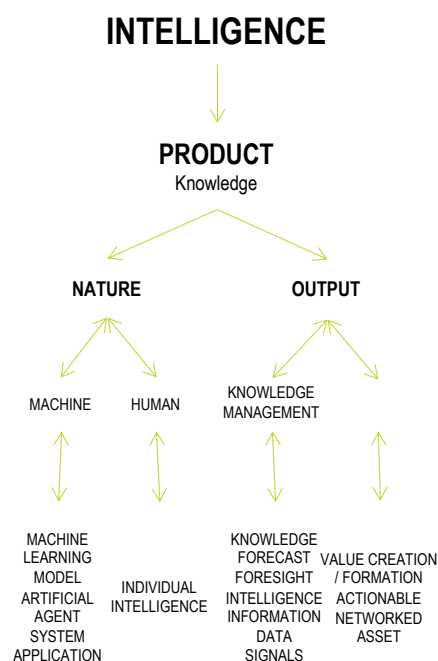


Figure 3.12 – CI Product core defining dimension detail

CI Product dimension is concerned with both the output and the outcome of the CI Process and Practice. The nature of this output can be both machine and human, complementing each other. The output is the creation of knowledge in its various forms (e.g., know-what, know-why, know-how) and its management within the organisation. Knowledge as output must also meet some characteristics, such as the creation of added value, that it is actionable and networkable (collective knowledge) and provides value to the organisation. The last characteristic highlights the importance of CI to the knowledge-based theory of the firm (Nonaka & Takeuchi, 1995; Grant, 1996; Spender, 1996).

3.4.4.5. CI Purpose dimension modular components

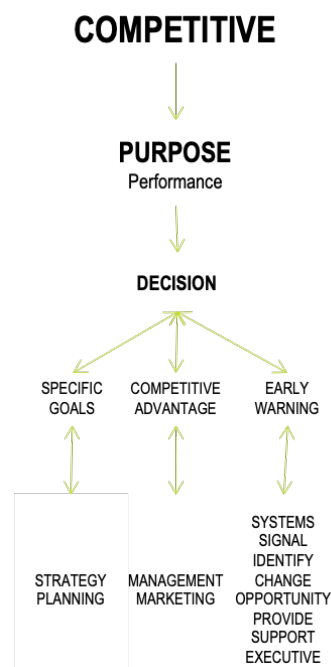


Figure 3.13 – CI Purpose core defining dimension detail

The CI Purpose dimension deals with the ultimate goal of any organisation, performance. The antecedent of performance is the decisions the organisation makes in three areas. First, the specific decisions regarding strategy and planning. Second, the creation, development, and sustainability of competitive advantages through the allocation of resources (management) and the development of profitable customer and consumer loyalty (marketing). Third, supporting decisions that must be made today to take advantage of future opportunities. It should be noted that the terms risk or threat do not appear as keywords in this or any other dimension. In fact, they do not appear among the top one hundred keywords. This fact raises several questions: Why is it that risk and threat do not appear as keywords? Can this

dismissive attitude toward risk and threat explain CI's low acceptance of risk management? These could be avenues for future research.

3.4.4.6. CI Practice dimension modular components

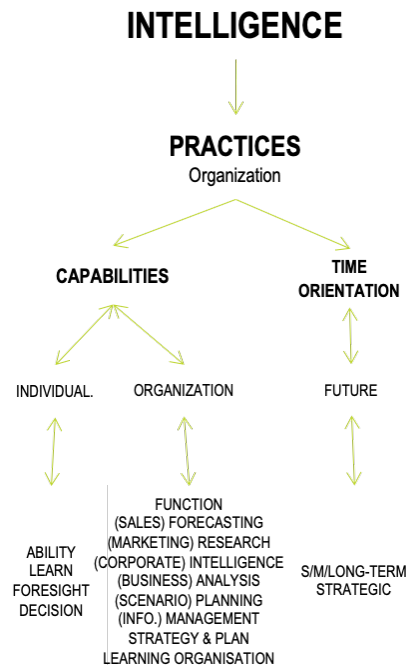


Figure 3.14 – CI Practice core defining dimension detail

CI Practice dimension is primarily concerned with the skills needed and time orientation in developing intelligence. Given that performance improvement and decision-making can only occur in the present, the future-directed time orientation becomes apparent. Most importantly, it establishes an important distinguishing characteristic of CI from, for instance, information or knowledge management. The latter two are concerned with existing information or knowledge, whereas CI is with developing foresight. In other words, developing insights about what is plausible in the future. Moreover, these insights need to be strategic and support the organisation's short-, medium-, and long-term goals, not just have ad hoc nice-to-have requests for tactical insights. The other side of intelligence practice is the need for both individual and organisational capabilities. These support time orientation not only by helping to anticipate but also to learn and support or influence decision-making and its implementation. In larger organisations, this may take the form of a dedicated function. In any case, the organisation must learn from its cognition development and decision-making to become a learning organisation (Daft & Weick, 1984).

Finally, as an expected contribution of the modular definition, the combination of key terms from each dimension allows for the definition of terms not only within the CI domain but also of related terms from other domains. These definitions allow to mitigate the confusion of term meanings and terminology, thus helping to reduce polysemy and synonymy. Using the terms mentioned in Section 1 to illustrate polysemy (business intelligence; competitor intelligence) and synonymy (competitive strategy; strategic planning; market research), the following section attempts to define and delineate them. Using the modular definition framework from Figure 3.9, business intelligence is the process and practices used in producing knowledge with internal business information to improve organisational performance. Using the same logic, competitor intelligence is the process and forward-looking practices used in producing knowledge about competitors to improve organisational performance. The terms used as synonyms earlier are now defined as follows: market research is the process and practices of researching the external market environment to support specific decisions to achieve specific objectives; strategic planning is the process and practices that support specific decisions regarding the development of strategy and the planning of its execution; competitive strategy is a set of decisions about how an organisation operates in the competitive environment to achieve a specific objective. Finally, it should be noted that the above definitions are not intended to define these terms comprehensively but rather to highlight the differences between these terms and CI.

Table 3.2 compares the unified view's overarching definition with the top five previously most cited definitions on Google Scholar and with the most recent, relevant published definitions. The analysis was intended to highlight the contribution of the unified view in terms of both accuracy (coverage of all dimensions) and precision (explanatory power of the concepts used). In addition, the modular definition identifies the core defining dimensions and the respective key descriptors in a structured manner, allowing for more precise definitions of intermediate concepts in CI.

Table 3.2 – Unified view versus most cited and recent definitions Contribution of the unified view compared to most cited and recent CI definitions ordered by citations

Reference	Citations (Google Scholar)	Definitions	Process	Practices	Product	Purview	Purpose
Unified View	N/A	CI is the process, and forward-looking practices used to produce knowledge on the competitive environment's purview with the purpose of improving the organization's performance.	1	1	1	1	1

(Kahaner, 1997)	1004	Competitive intelligence is a systematic program for gathering and analysing information about your competitor's activities and general business trends to further your own company's goals.	.5	.5	.5	1
(Bose, 2008)	400	Competitive Intelligence is a vital component of a company's strategic planning and management process ... allows a company to anticipate market developments proactively rather than merely react to them ... is external intelligence about the firm's competitors.	1	.5	.5	.5
(Xu et al., 2011)	381	Competitive Intelligence involves the early identification of potential risks and opportunities by gathering and analysing information about the environment to support managers in making strategic decisions for an enterprise.	.5		.5	1
(Liebowitz, 2006)	307	Competitive Intelligence have both internal and external components ... is used to solve both short-term and long-term problems ... the greatest value is strategic planning ... has a gathering, analysis, and management component ... for the CI analyst to base his or her opinions ... for forecasting external and internal trends looking 3 to 5 years out and beyond... to determine how the organization can best prepare for these new situations. For analysis to be actionable, it should be forward looking and decision relevant.	.5	.5	.5	1
(Nicholas, 2000)	306	Competitive intelligence is about information gathering and use, looking for opportunities and threats; driven by the expression of the managers needs and expectations, focused on finding the information believed to be wanted, which they would like to have.	.5		.5	.5
(De Almeida et al., 2016)	83	Competitive intelligence is a process that produces and disseminates actionable information from and about the firm's external and competitive environments to help managers in decision-making and achieve a competitive advantage.	1		.5	1
(Pellissier & Nenzhelele, 2013b)	62	Competitive Intelligence is a process or practice that produces and disseminates actionable intelligence by planning, ethically and legally collecting, processing and analysing information from and about the internal and external or competitive environment to help decision-makers in decision-making and provide a competitive advantage to the enterprise.	1	1	.5	1
(Bartes, 2014)	22	Competitive Intelligence is ... a forecast of the future, in the area of strategic management, ... a system application discipline, ... information in connection with the analyst's person, ... principle of a government intelligence service, ... two-level activity ... continuous monitoring of the company's surroundings ... intelligence analysis of information ... output should be new knowledge – intelligence ... there must be a proposal for the hypothesis realised by the competitor, an engineering activity, ... legality and ethics in the activity. CI as the creator of materials for strategic decision-making of the company's top management.	.5	.5	1	.5
(Maungwa & Fourie, 2018)	17	Competitive Intelligence is understood as the interpretive product of a process for gathering and analysing external data and information to the end of improving decision-making—serves as a research, development, and innovation framework for organisations that seek to improve their competitiveness by high-value data and information in their processes, products, and service.	1		1	.5
(Cavallo et al., 2020)	14	Competitive Intelligence is a process that generates actionable information about the firm and its external environment to help firms in making market-related decisions.	1		.5	1

3.4.5. Limitations of the study

Although this unified view is based on scientific and practical literature, there is a lack of empirical confirmation, which is the next step in our research program. A survey of the entire CI community to confirm the general findings or in-depth expert interviews to verify the inner

details and idiosyncrasies of the field are crucial to solidify and further validate the conclusions of this research. Given the complexity of the CI concept and the variety of audiences, from novices to experts, from scholars and educators to managers, the author points out the need to go beyond the general, broad definition and to read the more detailed explanations by dimension and level carefully.

3.5. CONCLUSION

This study provides a unified view and modular definition for CI. Although it adds to previous knowledge by providing the first holistic view of the CI field, the ultimate goal is to serve as a foundation for future practice and research. In addition, clarifying and defining the view narrows the body of knowledge of CI, which is fundamental to the scientific and pedagogical development of the field and its recognition as a profession. Finally, it contributes to academic and business adoption by identifying the critical dimensions addressed in research, establishing the practice or business function, and developing curricula to support teaching. Thus, the potential impact spans academia, business, and society.

This study fulfils the need for a unified view to justify the theory and practice of CI: “CI is the process and forward-looking practices used in producing knowledge about the competitive environment to improve organisational performance.” The proposed definition aims to eliminate the existing polysemy and synonymy in CI terminology. Thus, it serves as a basis for future practice, research, and teaching. Clarifying the meaning of CI should drive acceptance in business and lay the foundation for establishing CI science. Furthermore, a more consensual definition will enable the delineation of the body of knowledge of CI, reversing the current vicious cycle that hinders the development of the discipline. CI scholars can, therefore, conduct research and develop curricula based on a shared understanding of CI. This increases the quality of CI education and general awareness, which promote acceptance in the business community. Advancing practice modifies empirical findings, completing the virtuous cycle with more scientific research, education, and business practice, as shown in Figure 3.15.

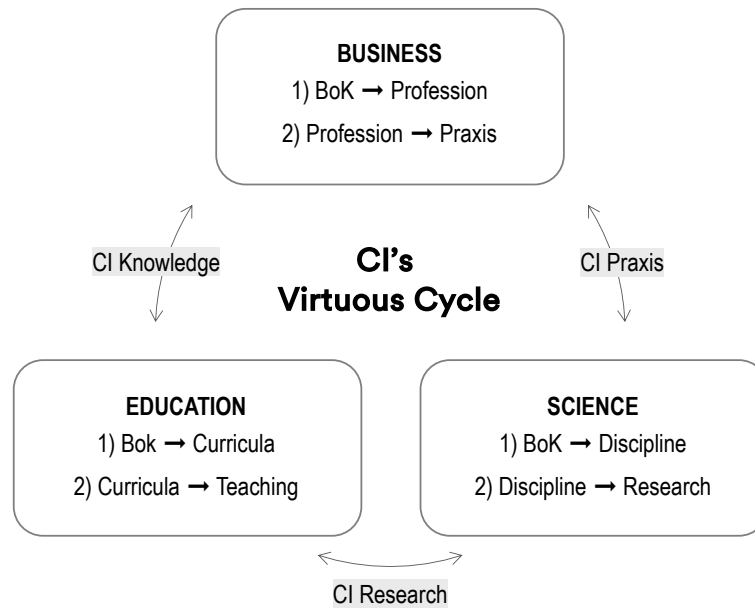


Figure 3.15 – The Virtuous Cycle of CI - Author's development

The modularity of the definition provides information about the process to be followed, the viewpoint to be focused on, the product to be achieved, the purpose to be sought, and the foundations for successful practice. For brevity, the authors have referred to these five core defining dimensions as the “5Ps of CI” to encourage application and use. The application of these guidelines in an integrated manner in practice and theory can improve the effectiveness and efficiency of CI. Ultimately, it will enable CI to fulfil its mission by improving the quality of decision-making and, thus, the sustainable development of firm performance.

4. COMPETITIVE INTELLIGENCE EMPIRICAL CONSTRUCT VALIDATION USING EXPERT IN-DEPTH INTERVIEWS STUDY

4.1. INTRODUCTION

Scholars and practitioners have extensively defined competitive intelligence over the last century. Regardless, there is no consensual definition, a necessary condition to clearly delimit the CI Body of Knowledge (BOK). The resulting conceptual void compromises the effectuation of the discipline, curricula, and profession, considerably detaining practical, scholarly, educational, societal, and policy management research (Wickert et al., 2020). Subsequently, this void compromises the construct's empirical validation, a sufficient condition for developing CI science and praxis. Thus, the absence of an empirically validated construct negatively impacts business executives, decision-makers, researchers, students, and educators.

To date, there have been six attempts to develop a universal definition for CI (Bartes, 2014; Breakspear, 2013; Brody, 2008; Madureira et al., 2021a; Marcial, 2018; Pellissier & Nenzhelele, 2013b). Amongst those, Madureira et al. (2021a) offers: 1) the greatest recency; 2) improved comprehensiveness with eight hundred and twenty definitions analysed; 3) increased breadth encompassing all relevant related fields of knowledge, the worlds of business, science, and education, and all types of scholarly and practitioner cohorts; 4) the lowest subjectiveness using quantitative and qualitative methods, notably, a mathematically computed optimal number of the core defining dimensions; and 5) thoroughness, as the only definition from the extant literature that covers all core defining dimensions, the 5Ps of CI. As such, we use the aforementioned definition as the baseline for this study: "CI is the process and forward-looking practices used in producing knowledge about the competitive environment to improve organisational performance" (Madureira et al., 2021a).

The main concerns of theory development are validity – measuring the right phenomena, reliability – consistent measuring, and applicability – relevance to the praxis (Loevinger, 1957; Rosemann & Vessey, 2008). Particularly, construct validity "is one of the most significant advances of modern measurement theory and practice" (Kerlinger et al., 2000, p. 670) and researchers cannot minimise the importance of its rigour and relevance. This overarching type of validity refers to the quality of the translation of the construct into a functioning and operating reality as the "approximate truth of the conclusion or inference that the operationalisation accurately reflects its construct" (Trochim et al., 2016). Given the inexistence of empirical validation for the CI construct, it confirms the validity, reliability, and applicability of the unified view and modular definition proposed by Madureira et al. (2021a) is of the utmost importance. Thus, this study aims to fill this foundational research gap by conducting a conclusive empirical CI construct validation drawing from top global CI subject matter experts. The main expected contributions are the increased rigour and relevance to ground future CI theory development. Furthermore, the potential reduction of polysemy and synonymy in and between CI and related terms enables the creation of a common language that clarifies and guides future praxis. Finally, study results are expected to further legitimise

the CI function, profession, and science. The paper starts by describing the methodology followed, namely the sampling and the data sets, followed by the methods in tandem with its results. It finishes with a discussion of the main results and inferences, pointing to future research opportunities in CI.

4.2. METHOD & RESULTS

The investigation is confirmatory, relying upon a multistrand design of sequential partially mixed methods with qualitative and quantitative methods equivalent status. Considering that the CI construct is foundational for the information and organisational sciences (Borko, 1968; Marcial, 2018) and, like other pivotal constructs, is an “unobservable” theoretical concept, we used content analysis, most specifically computer-aided text analysis (CATA), as the primary tool to capture and measure this latent construct. As a research method, content analysis is the systematic, objective, quantitative analysis that uses a set of procedures to reliably classify or categorise message characteristics from the rhetorical content (Doriau et al., 2007). This study follows the construct validation using CATA methodological guidelines developed by Short et al. (2010), a tried and tested approach combining conceptual and empirical approaches to guarantee proper psychometric measurement.

4.2.1. Data Collection: Sample Selection & Interview Protocol

The data collection was based on purposive sampling following a concurrent sampling strategy. The decision to use in-depth interviews acknowledges its main qualities, such as the level of depth, disclosure, quality, and timeliness (Kvale & Brinkmann, 2015). The most prominent criterion was the inclusion of the empirical perspective in the study, thus allowing for the applicability check of the construct. We followed the four steps suggested by Ritchie [16], starting with defining the sampling strategy, developing the in-depth interview protocol, conducting the interviews, and finally analysing the data. As such, well-renowned CI experts from five different background cohorts were selected based on their proficiency and usage of CI. Participants varied in their profile and demographic details regarding their highest education qualifications, formal training, years of experience, job descriptions, and professional positions within the CI field. Academics (scholars, authors, and educators), advisors (consultants and technology providers), thought leaders (community leaders and public speakers), professionals (practitioners developing CI), and executives (decision-makers using CI) were prompted for their points of view and perspectives on CI and the proposed unified view and modular definition. The interviews (deMarrais, 2004) were performed person-to-person via cloud-based video communication apps with semi-structured questions placed in order but flexibly. The researcher deliberately established rapport to achieve candid and unbiased communication, and rich feedback could emerge and be shared (Rubin & Rubin, 2012). The interview started by obtaining consent to video record and mentioning the identity of the experts. We paid utmost attention to the privacy of the interviewees who gave their consent to be named but not quoted verbatim. The questions that followed focused on logically addressing the research objectives. Probing

questions were added to allow the experts to clarify the meaning, address the gaps in the answers, or lay out their unrestricted perspective in greater depth (Merriam & Tisdell, 2015). Generally, we started by obtaining the expert's perspectives on what CI is today, their working definition, and their respective dimensions. Following this, we collected their feedback on Madureira et al.'s (2021a) definition, dimensions, and descriptors. The interview ended time availability allowing, with the experts foreseeing the impact and contributions of this study.

Data collection resulted in more than fifty interviews, of which the first twenty were used for this study due to time constraints. Each interview corresponds to a minimum hour-long video recording, and the transcript was uploaded into ATLAS.ti 8.4.5 for Mac. We included the foundational data set – Literature Definition Corpus (LDC N = 816) – containing the definitions extracted from the CI literature review covering the last century, which we used to develop the CI unified view and modular definition (Madureira et al., 2021a). This data set allowed for content validity, reliability, and dimensionality analysis.

4.2.2. Data Reduction: Flexible Coding and CATA

The decision to write this specific section acknowledges the criticality of data reduction to the qualitative analysis (Miles et al., 2020) as a pivotal input to the quantitative analysis strand performed next. Given the confirmatory nature of this study, we used CATA based on deductive factual (actual content, not its interpretation) and directional coding (confirmative feedback). The aim was to avoid subjectivity and interrater reliability issues. This approach allows for the automated word frequency count pivotal to quantising the in-depth interviews. The coding framework was based on the modular definition represented by the visual abstract from Madureira et al. (2021a) translated into factual analytic codes representing its attributes, the core defining dimensions, subdimensions, and descriptors. We chose the “flexible coding” method (Deterding & Waters, 2021), given that it is better suited to the realities of analysing in-depth interviews with qualitative data analysis software. According to its authors, the goal of this approach is “to support rigorous, transparent, and flexible analysis of in-depth interview data.” Therefore, we chose the word as the unit for content analysis serving as the basis for quantising the transcripts. The final result was the statistical summarisation of the analytic codes (Neuendorf, 2019) applied to focused parts of the transcripts, namely the experts’ definitions and feedback, given the unified view and modular definition of CI.

The reduction process resulted in three additional data sets. The second data set of the study – Dimension Word Lists (DWL N = 5) – is made of the “word lists” for each of the CI dimensions, the 5Ps: Process, Purview, Product, Purpose, and Practices (Madureira et al., 2021a). The third data set – Experts Feedback Corpus (EFC N = 20) – is the per expert feedback to the CI definition and unified view. In other words, this data set includes the word counts by each expert of the CI construct and its dimensions and descriptors, the CI domain. Finally, the fourth data set – Experts Definition Corpus (EDC N = 20), is the working definition corpus prompted by each expert and extracted from the interviews.

4.2.3. Data Analysis: Empirical Construct Validation

Rigour and relevance to practice are two critical issues in the research (Rosemann & Vessey, 2008; Trochim et al., 2016, p. 26). Rigour relies on applying a scientifically sound methodology, notably on the validity of the propositions reached by (Trochim et al., 2016). In this study, validity is the assessment of whether what is observed is representative of the construct. The focus of this section is thus the validity, reliability, and applicability checks of the unified view and modular definition. We followed Short et al.'s (2010) recommended validation procedures using CATA, suggesting that such a process can effectively validate the latent CI construct (Figure 4.1).

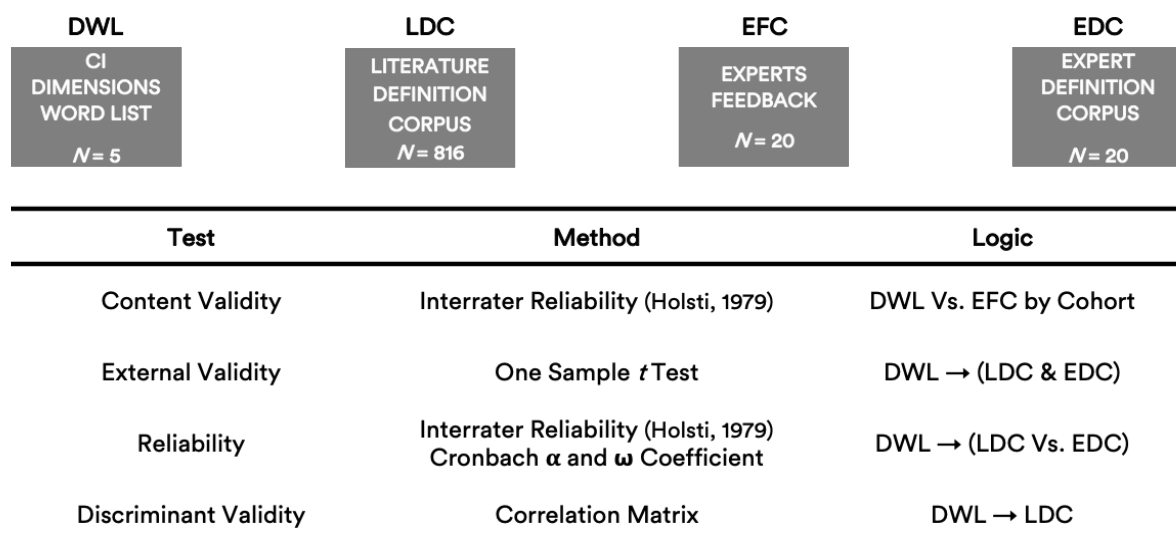


Figure 4.1 – Data Sets and Data Analysis Roadmap for CI Construct Validation

4.2.4. Content Validity

Following Short et al. guidelines (2010), we started by choosing the working definition, the CI unified view and the modular definition from Madureira et al. (2021a). An initial assessment of CI dimensionality resulted in importing the 5Ps, or the core defining dimensions from the same theory, to be validated. Consequently, the most critical step consisted of developing an exhaustive list of keywords for each 5Ps. As per Short et al. (2010) and Neuendorf's (2017) recommendations, multiple discrete deductive word lists were created. The process was based on the original twenty keywords from the original topic modelling from Madureira et al. (2021a), to which we added an exhaustive list of synonymous with the aid of Rodale's (1978) Synonym Finder. We eliminated repeated words by selecting the word with the highest explanatory power to the respective dimension they were attributed to in the end. The terms used in the graphical abstract (Madureira et al., 2021a) absent from the original keywords were used to complete the list inductively, per Short et al.'s (2010) recommendation. Finally, the expert's opinion regarding the final word lists served to validate the word lists. To guarantee the correct word meaning was conveyed, the interviewer explained the terms in detail and context using the graphical abstract. The feedback from the experts is included in the EFC data set as word counts. The DWL and the EFC data sets were then compared for

agreement to compute and assess the interrater agreement. According to Short et al. (2010) recommendation, we used Holsti's (1969) formula:

$$PAO = 2A / (nA + nB + \dots + nF) \quad (1)$$

where PAO is the proportion of agreement observed, A is the number of agreements between all the raters, and nA , nB , ..., and nF are the individual number of coded words for each cohort. Moreover, we compared the DWL and EFC data sets by stakeholder cohort to reinforce the content validity check analysis.

The results of the content validity analysis are summarised in Tables 4.1, 4.2, and 4.3.

4.2.5. External Validity

As per Short's recommended procedures (2010), we started by identifying the appropriate samples and narrative texts. The first sample is the expert's working definition corpus, the EDC. The second sample is the original LDC data set used as the baseline for comparison. We then conducted a one-sample t-test (compared to a test statistic of zero) for the LDC and EDC data sets. The results allowed us to assess and compare the presence of language consistent with the CI definition in the definitions from the literature review and within the expert's working definitions extracted from the in-depth interviews.

Table 4.4 presents the results of this validation procedure.

4.2.6. Reliability

Short et al. (2010) procedural recommendation for evaluating reliability relies on comparing word counts between relevant samples to assess the similarity of the operationalisation of the construct in different contexts. For this purpose, we used Holsti's interrater reliability approach to assess this similarity between the samples, the LDC and EDC data sets. Additionally, we computed the Cronbach's (α) and the Omega (ω) coefficient for the CI Construct and by dimension in both samples. The aim was to measure the proportion of CI construct total variance attributable to a common source. In other words, we assessed the presumably actual score of the CI constructs underlying the dimensions. The reason for calculating ω is that it relaxes the assumption of a tau-equivalent model, strengthening the acceptability of the model, according to Nunnally (1978).

Tables 4.5, 4.6, and 4.7 summarise the results of the reliability validation procedures.

4.2.7. Discriminant Validity

Discriminant validity, or dimensionality, refers to the degree to which each word for a dimension strongly relates to the other words of the same dimension. At the same time, in parallel, it is also uncorrelated with words that define different dimensions of a construct – Short et al. (2010) suggests examining the correlation matrix to perform this validation assessment. Therefore, we calculated the correlation matrix for the LDC.

Table 4.7 summarises the results of this dimensionality validation procedure.

Table 4.1 – Final Word Lists by CI Dimension

CI Dimension	Word Sourcing and Contribution to Final Word Lists		
	Topic Modelling	Synonyms	Graphical Abstract
D1 - PROCESS	competitive, analysis, collection, making, systematic, plan, networking, development	procedure; operation, course, line, policy, polity, guidelines; method, methodology, technique; approach; wise, manner, means, mode, fashion, style, ways; standard operating, SOP, rule, manner, process, course action; transaction, proceedings, step	activities
D2 - PURVIEW	competitor, market, customer, product, firm, company, industry, capability, advantage, develop, technology external, internal, environmental, environment, business, sale	jurisdiction, bailiwick, province; sphere, compass, orbit, area, territory, responsibility, scope, field	macro, micro, meso
D3 - PRODUCT	knowledge, datum, data, human, machine, value, create, form, asset, learning, organizational, model, application intelligence, information, actionable, network, forecast, foresight, artificial, agent, systems	production, produce, product, output, turnout, goods, offerings; work, handiwork, artifact, representation, symbol, image, creation, result, effect, outcome	machine, natural, nature, knowledge, learning
D4 - PURPOSE	system, support, signal, function, provide, executive, specific, goal strategy, decision, plan, management, marketing, identify, change, opportunity,	reason, point, why, principle, guiding, principle, basis, root, idea; motive, motivation, mainspring, drive, driver, driving, force, cause; rationale, explanation, background, meaning; rationalization, justification, excuse, intention, intent, aim, spirit; objective, object, target, mark, destination, end, view, mind, ultimate, aim, expectation, expected, aspiration, vision, dream, ideal, wish, hope, desire, desideratum, ambition, drive, pursuit; intentness, central, idea, main, heart, gist, kernel, core, essence; concern, interest; profit, gain, return, vision	purpose, performance, planning, early, warning, weak signals
D5 - PRACTICES	research, future, activity, term, corporate, scenario, individual, ability, learn, organization, strategizing, strategic	habit, custom, modus, operandi, common, practice, usual, things, general, usual, procedure, routine, convention, ways, done, conduct, trade	capabilities, short, medium, long, learn, organization, management, scenario, corporate, forecasting, research

Table 4.2 – Holsti (1969) Interrater Reliability

CI Dimension	DWL Vs. EFC			
	Agreement (A)	nA	nB	PAO = 2A / (nA + nB)
D1 - PROCESS	27	35	27	87%
D2 - PURVIEW	23	29	23	88%
D3 - PRODUCT	38	42	38	95%
D4 - PURPOSE	60	81	60	85%
D5 - PRACTICES	26	34	26	87%

Table 4.3 – Holsti (1969) Interrater Reliability

CI Dimension	DWL Vs. EFC by Cohort				
	CIP	Leader	Advisory	Executive	Academic
D1 - PROCESS	85%	91%	92%	83%	92%
D2 - PURVIEW	82%	88%	91%	82%	91%
D3 - PRODUCT	89%	92%	94%	89%	95%
D4 - PURPOSE	73%	84%	88%	73%	89%
D5 - PRACTICES	81%	90%	90%	83%	90%

Table 4.4 – LDC & EDC One-Sample *t*-Test Results

CI Dimension	LDC				EDC			
	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>t</i> -Test ^a	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>t</i> -Test ^a
D1 - PROCESS	816	2.16	2.76	22.3*	20	2.50	1.36	8.24*
D2 - PURVIEW	816	1.98	2.51	22.5*	20	1.90	1.62	5.25*
D3 - PRODUCT	816	4.23	3.92	30.8*	20	2.60	1.14	10.18*
D4 - PURPOSE	816	1.64	2.24	20.9*	20	0.80	0.77	4.66*
D5 - PRACTICES	816	1.71	2.28	21.4*	20	0.70	0.87	3.62

^a Note: The results of this table were based on CATA using word lists for CI dimensions presented in table 1 * $p < 0.01$.

Table 4.5 – Holsti (1969) Interrater Reliability

CI Dimension	LDC Vs. EDC			
	<i>Agreement (A)</i>	<i>nA</i>	<i>nB</i>	$PAO = 2A / (nA + nB)$
D1 - PROCESS	9	29	9	47%
D2 - PURVIEW	11	22	11	67%
D3 - PRODUCT	11	36	11	47%
D4 - PURPOSE	6	58	6	19%
D5 - PRACTICES	6	28	6	35%

Table 4.6 – LDC Cronbach α and ω Coefficient

Construct / Dimension	LDC			
	<i>Mean</i>	<i>SD</i>	α	ω
CI	2.34	2.00	0.76	0.77
D1 - PROCESS	2.16	2.76	0.67	0.70
D2 - PURVIEW	1.98	2.51	0.72	0.74
D3 - PRODUCT	4.23	3.92	0.73	0.73
D4 - PURPOSE	1.64	2.24	0.71	0.74
D5 - PRACTICES	1.71	2.28	0.73	0.75

Table 4.7 – EDC Cronbach α and ω Coefficient

Construct / Dimension	Mean	SD	EDC	
			α	ω
CI	2.34	0.60	0.26	0.41
D1 - PROCESS	3.50	1.62	0.35	0.50
D2 - PURVIEW	4.10	1.62	0.03	0.34
D3 - PRODUCT	2.60	1,14	0.20	0.41
D4 - PURPOSE	0.80	0,77	0.08	0.15
D5 - PRACTICES	0.70	0,87	0.34	0.42

Table 4.8 – LDC Correlation Matrix ^b

Construct / Dimension	LDC				
	D1	D2	D3	D4	D5
D1 - PROCESS	-				
D2 - PURVIEW	0.51**	-			
D3 - PRODUCT	0.50**	0.33**	-		
D4 - PURPOSE	0.45**	0.33**	0.44**	-	
D5 - PRACTICES	0.38**	0.35**	0.35**	0.39**	-

^b Note: *p < 0.05. **p < 0.01. Data Interpretation: Inferences and Meta-inferences

4.2.8. Data Interpretation: Inferences and Meta-inferences

Although there is no generally accepted rule of thumb for interrater reliability coefficients, it is suggested that interpreting as indicative of high-reliability values greater than 0.80, according to Riffe et al. (2019) and Krippendorff (2018), or coefficients between 0.75 and 0.80, according to Ellis (1994). Whatever the perspective, the overall results are over 0.80 for all dimensions (Table 4.2) and across all stakeholder cohorts (Table 4.3), confirming content validity.

The zero t-Test results of the LDC and EDC data sets indicate that language consistent with a definition of CI is present in both samples. Furthermore, Table 5.4 shows that all dimensions differed from zero and significant. Therefore, it confirms overall external validity.

The interrater reliability coefficients from Table 4.5 show moderate interrater reliability between the LDC and the EDC. Table 4.6 shows both Cronbach α and the ω coefficient results for the LDC above the 0.70 commonly recognised thresholds for acceptance. Notably, the results are closer to the 0.80 threshold for high internal consistency and reliability. Finally, Table 4.7 shows the same results for the EDC, which reveal a more moderate level of reliability.

Regarding dimensionality (Table 4.8), the LDC data set exhibits an optimum level of correlation between dimensions no higher than 0.40 (p < 0.01) (Short et al., 2010). Thus, the results confirm the multidimensionality and discriminant validity of the CI construct.

Overall, the results and respective inferences confirm the empirical validation of the CI construct exhibiting content, external and discriminant validities, and reliability. Furthermore, the feedback from top subject matter experts from all cohorts should ensure its applicability in practice.

4.3. DISCUSSION

The validation of the CI unified view and modular definition proposed by Madureira et al. (2021a) is ground-breaking for the CI discipline. It is the first and the only one of six universal CI definitions to be scientifically validated. Notably, this definition was built on the shoulder of giants and validated based on feedback provided by twenty top subject matter experts from different cohorts. Hence, it is a solid theoretical and empirical base for the development of CI in a new era where it is needed the most. Furthermore, it should inform the effectuation of the CI function in business, the curricula in education, and the discipline in science. These first-order impacts will probably lead to an improved society capable of tackling grand challenges, increasing competitiveness and value creation, and better policy development through a deeper understanding of important issues. These factors should guarantee its adoption, relevance, and future development of the praxis and theory of CI.

The study comes with its limitations. We considered only twenty of the fifty global expert in-depth interviews held during this study. Considering the remaining interviews can reinforce the validity checks, notably the reliability. Therefore, we will continue processing the collected data to strengthen this contribution further and expand CI science. Several paths for future research are opened, ranging from developing new and improved CI constructs given the longitudinal dynamics of CI to confirming the results presented in this study. An important path is to research the impact of this study on management research, namely in the areas that make a difference: science, practice, education, society, and policy (Wickert et al., 2020). In addition, the generalisation of the CI construct proposed by Madureira et al. (2021a) can be a very fruitful and challenging area for research. Inversely, disproving it can also be the path chosen by researchers. Researching the applicability check (Rosemann & Vessey, 2008) is another path this research opens. Finally, the findings of this study can be confirmed using different methodologies rather than the CATA-based method used in this study (Short et al., 2010).

4.4. CONCLUSION

This confirmatory and global in-depth interview study of leading subject matter experts aimed to empirically validate the CI unified view and modular definition proposed by Madureira et al. (2021a) as “the process and forward-looking practices used in producing knowledge about the competitive environment to improve organisational performance”.

Confirmation of content, external and discriminant validities, and reliability filled this foundational gap for the first time in a more than a century-long history of the CI discipline.

Scholars and practitioners now have a solid ground for developing. Therefore, it advances prior knowledge while creating a more rigorous and relevant baseline, opening future research and theory development paths. According to Colquitt and Zapata-Phelan's (2007) taxonomy of theoretical contributions for empirical articles, this article should classify as an "Expander." This research also introduces a new construct, and grounds predictions with an existing theory tested with data collected from global top CI subject matters. It also potentiates the delivery of high theoretical and empirical contributions to the CI field. Furthermore, by igniting the virtuous cycle of CI (Madureira et al., 2021a), the immediate effectuation of the CI discipline, profession, and education should become a reality. Therefore, it should produce an effective impact in practical, scholarly, educational, societal, and policy development, elevating the stature of CI science.

5. COMPETITIVE INTELLIGENCE MATURITY MODELS: SYSTEMATIC REVIEW, UNIFIED MODEL, AND IMPLEMENTATION FRAMEWORKS

5.1. INTRODUCTION

Competitive Intelligence (CI) is “the process and forward-looking practices used in producing knowledge on the competitive environment to improve organisational performance” (Madureira et al., 2021a, 2021b). The maturity of the CI practice is positively correlated with being a learning organisation (Senge, 2006). A learning organisation addresses future decision-making proactively, effectively, and efficiently. Within the contingency theory (Fiedler, 1964; Vroom & Yetton, 1973), organisations use decision-making to achieve a strategic fit with their competitive environment (Duncan & Weiss, 1979). The better the decision-making, the greater the fit and the organisational performance (Eisenhardt, 1989). Therefore, CI maturity is both an antecedent and a proxy for organisational performance.

In the current zeitgeist of a VUCA world with an exponentially increasing speed of change (Bennett & Lemoine, 2014), obtaining and maintaining the strategic fit to sustain top performance is the ultimate challenge. CI is thus vital to navigating highly challenging environments, remaining competitive (Harkleroad, 1998; Hedin, 2005; Vedder & Guynes, 2001), and ensuring the superior performance of organisations (Yap et al., 2018, 2013; Yap & Rashid, 2011). The problem arises in maintaining a CI maturity level that allows organisations to deal with change. Kahaner (1997) has long identified the critical change drivers as the increasing business pace, information overload, more aggressive and global competition, geopolitical changes, and rapid technological change. Nassim Taleb (2007) provided further insight into their volatility and unpredictability. Recent academic and business research corroborates and reinforces the severity of the impact on both organisations and the CI practice (Heppes & Du Toit, 2009; Calof, Sewdass, et al., 2017; M-Brain et al., 2019; Klue & SCIP, 2021; ACI & Gilad, 2022; Crayon & SCIP, 2022). As a result, CI evolves up to the average maturity level (Hedin et al., 2014; Heppes & Du Toit, 2009; M-Brain et al., 2019). Organisations must be able to address these impacts in setting up, assessing, adapting, and developing the CI maturity level to obtain top performance. Therefore, the Competitive Intelligence Maturity Model (CIMM), consisting of several archetypal levels of achievement across the different dimensions and aspects, is a critical assessment and guidance tool supporting the CI practice evolutionary path.

Previous literature consists of tens of CIMMs. The development approaches for these models range from identifying best practices (APQC et al., 2004; Calof, 1998; J. P. Herring & Leavitt, 2011; Marceau & Sawka, 1999) to assessing cutting-edge CI functions (CIF), programs (CIP), or systems (CIS) (Heppes & Du Toit, 2009). Academic investigations (Calof, 1998; Oubrich et al., 2018), executive opinion (Marceau & Sawka, 1999), practitioners’ self-assessments (Comai & Prescott, 2007), and CI experts’ professional judgment vendor-sponsored studies (M-Brain et al., 2019) have been the formats of choice in evaluating the professional status and developmental progress of the CI practice. Benchmarking versus an independently

established model (Hedin et al., 2014) and case studies are the most frequently used methods (J. P. Herring & Leavitt, 2011). However, CI dimensions, descriptors, and maturity levels used vary considerably. Most importantly, MMs are not exhaustive regarding the CI dimensions and aspects. As a result, given the broad range of existing CIMMs, it is incredibly challenging to compare and identify the relevant model to use for improving practice or scientific research. Furthermore, no CIMM fully aligns with the conceptual definition of CI, its longitudinal evolution over time, or its full array of dimensions and aspects. These difficulties profoundly impact the scientific development of the CI practice, especially in smaller and less mature organisations. Thus, researching a unified scientific CIMM (UCIMM) is extremely important for effective practical guidance to address the conflicting interests of academics, executives, practitioners, and vendors.

This study aims to fill this gap by performing a systematic literature review – using an explicit, systematic method for identifying, analysing, integrating, and synthesising prior research findings – contributing to the conceptualisation of CIMM research. This conceptualisation will allow for integrating relevant descriptors across all dimensions and levels of maturity into a holistic go-to UCIMM. The expected empirical contributions from such a unified model are the significant improvement of decision-making quality and the consequent business performance, the implementation guidance for the effectuation of the CI practice or function, and the increased productivity of CI professionals. Furthermore, grounding this theory development exercise in sound theoretical and empirical evidence will highlight critical gaps and paths to exploit while dismissing outdated, irrelevant and duplicate research (Webster & Watson, 2002). Our systematic review based on scientific, commercial and grey literature is expected to deliver on this objective.

The following section details the systematic literature review procedure according to the PRISMA statement (Page, McKenzie, et al., 2021). Results will then be critically analysed and discussed, and a UCIMM will be proposed in the sections that follow. Finally, we conclude with implications, recommendations for application, and further research avenues for this topic and the CI field.

5.2.LITERATURE REVIEW

To identify and characterise the relevant CIMMs published in the last three decades, we conducted the systematic review as outlined in Table 5.1:

Table 5.1 – Overview of the literature review based on PRISMA, Cooper and Webster & Watson Guidance (Cooper, 1988; Page, Moher, et al., 2021; Webster & Watson, 2002)

Item	Description
Scope	Focus on CIMMs as research outcomes and practices or applications from all types of literature. However, only CIMMs that meet the MM characterisation are within scope (cf. Section 3.2).
Goals	Identify, synthesise, and integrate existing CIMMs into a unified holistic CIMM (UCIMM) to support the development of a common linguistic framework covering all CI dimensions per the 5Ps (Madureira et al., 2021a).

Perspective	Espousal of position in demonstrating the value of integrating existing CIMMs with the 5Ps of CI.
Coverage	Exhaustive as it intends to be “comprehensive in the presentation of works relevant to the topic” (CIMMs).
Organisation	Historical in combination with CIMMs content analysis (Cooper, 1988).
Audience	CI scholars, CI practitioners, CI vendors, business executives, policymakers
Time frame	CIMMs literature published after 1980.
Conceptualisation	CI, MM, CIMM (cf. Section 2).
Search strategy	Combination and proximity of the search terms “maturity model” and “competitive intelligence” to ensure the exhaustiveness as mentioned above.
Sources	Database (DB), registers, CI journals (i.e., CIR and JISIB), and social web as we expect to find CIMMs from practitioner and commercial sources.
Procedure	Data was collected, analysed, synthesised and integrated by a single author to avoid reviewer bias for approximately one year between January and December 2022. DB search: Google Scholar, ScienceDirect (Scopus), AB/Inform (Proquest), JSTOR, Emerald Publishing, EBSCO (Business Source Ultimate). Specific CI Journals: Competitive Intelligence Review. Registry search: SCIP.org (Strategic and Competitive Intelligence Professionals). Social web search: use Google Search to identify leading practitioner and commercial literature [i.e., CI vendors (services and technology/software) CIMMs]. These sources cover journals, books, conference proceedings, and practitioner sources (Brocke et al., 2009). Backwards and forward search: reviewing the citations found in articles from the first step; “to identify articles citing the key articles identified in the previous steps” (Webster & Watson, 2002). All steps: examine at least titles, abstracts, and introductions in order to evaluate only relevant sources (Brocke et al., 2009).
Outcome	The anticipated outcome is an identification of the main CIMMs, their dimensions, and their aspects. We followed the guidance of Cooper (1988) to “combine organisations, [...] by addressing works historically within a given conceptual framework.” The chosen framework is the 5Ps (dimensions and descriptors) from the CI unified view and modular definition (Madureira et al., 2021a). To the best of our knowledge, still “no classification system for CIMMs exists to date.” Therefore, for the content analysis of the MMs, we use a concept-centric approach based on so-called concept matrices (Webster & Watson, 2002).

5.2.1. Definition of Key Variables and Study Boundaries

5.2.1.1. Competitive Intelligence

Until recently, the definition of CI was not consensual and changed over time, as the previous five universal definitions demonstrate (Bartes, 2014; Breakspear, 2013; Brody, 2008; Marcial, 2018; Pellissier & Nenzhelele, 2013b). However, Madureira et al. (2021a) developed a unified view and modular definition, the only empirically validated one (Madureira et al., 2021b). Furthermore, this definition provides the 5Ps – the core defining dimensions and respective descriptors – which may be used as a proxy for assessing the comprehensiveness of a CIMM. As such, we will use this working definition alongside its visual abstract as the guide for comparing and integrating the different CIMMs analysed in the literature review.

5.2.1.2. Maturity Models

Maturity is “the state, fact, or period of being mature” (Oxford English Dictionary, 2022a). As such, it implies the existence of an evolutionary process to achieve the desired end-state. A model is a simplified representation of reality used as an example to follow or imitate (Oxford English Dictionary, 2022b). A Maturity Model (MM) details the evolution levels (also known as stages or phases) of maturity across several structuring dimensions and their respective

aspects. Levels have differentiating descriptors providing the purpose and detailed characterisation of each level. Dimensions are areas of capability that structure the object of the model. Each dimension is subsequently structured into several aspects (also known as elements, activities, or measures) for each level (Bruin et al., 2005; Fraser et al., 2002). MMs serve as guide rails to the set-up and development path to achieve the targeted maturity level (Fraser et al., 2002). Lahrman & Marx (2010) characterised MMs as shown in Figure 5.1.

Criteria	Characteristics		
Dimensions	One-dimensional	Multi-dimensional	Hierarchical
Maturity principle	Continuous	Staged	
Number of audiences	Single	Multiple (configurations)	
Assessment approach	Qualitative	Quantitative	

Figure 5.1 – Fundamental characterisation of MMs (Lahrman & Marx, 2010, tbl. 1)

In this regard, we will base our study on a few considerations. First, De Bruin et al. (2005) guidance suggests that dimensions should be exhaustive and distinct. Second, MMs have single or multiple dimensions but can also be hierarchical. Hierarchical MMs are more complex and require a formal architecture of measures (Lahrman & Marx, 2010). Third, staged MM models require compliance with all the dimensions (Fraser et al., 2002), the specified goals and critical practices to reach the aimed level. Fourth, although we acknowledge the different MM audiences, this paper aims to provide industry-agnostic maturity recommendations. Finally, the maturity level assessment can be qualitative using descriptions or quantitative using Likert-like scales (Fraser et al., 2002).

5.2.1.3. Competitive Intelligence Maturity Model

CI maturity relates to the process of thoroughly developing its practice across all dimensions for each level of the model. This maturity can be computed in levels (staged model) or configurations (continuous model). Considering the previous sub-sections, the CIMM guides both the effectuation, the maturity assessment, and the improvement of the CI practice. Thus, CI maturity indicates the level of development for each of the 5Ps (dimensions) and respective descriptors for a predefined audience, organisation, industry, or country. Notable, CIMMs allow economic agents to assess, understand, and improve their performance. Finally, given that CI is multidisciplinary, the CIMM is a broader-scoped umbrella maturity model. As such, this study considers only CIMMs, not Business Intelligence, Market Intelligence, Data Management, Social Intelligence, or Capability Maturity Models (CMMs), as those would be specific and not representative of the overall CI concept.

5.3. THE CIMMs STATE OF THE ART

5.3.1. Literature Search Results

The search focused on six scholarly databases (DB), one register (SCIP.org), one specific journal (Competitive Intelligence Review), the Social Web, and Citation Searching (i.e., snowballing). We screened all the results except for Google Scholar and Google Search,

where we stopped at the saturation point, i.e., no more showing of relevant or duplicate CIMMs. We successfully retrieved all the 38 records sought and screened for relevant CIMMs matching the scope (cf. Table 5.1) and MM characterisation (cf. Figure 5.1). Snowballing – backward and forward search – allows us to identify five additional records. Scholarly DBs and registers allowed us to elite eight reports while other methods identified six further. The outcome was fourteen reports included in this study (Figure 5.2).

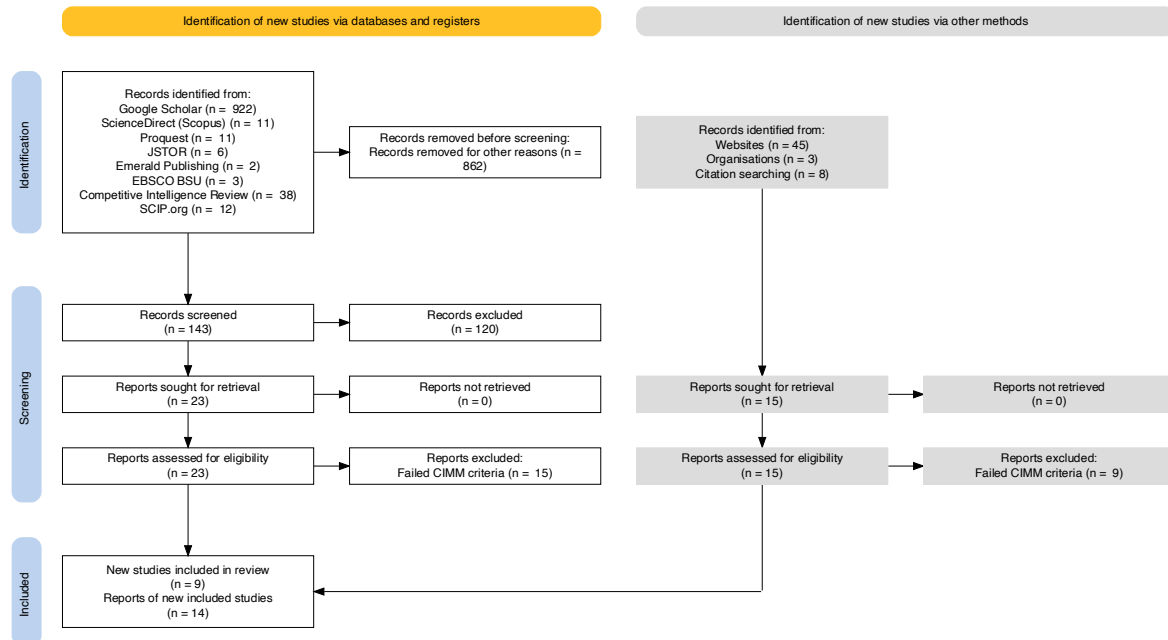


Figure 5.2 – PRISMA 2020 flow diagram used for the systematic review (Page, Moher, et al., 2021)

5.3.2. Overview of the selected CIMMs

The overview goes beyond the criteria from Section 5.2.1 by adding supporting scientific or empirical evidence and the motive supporting the development of the CIMM (Table 5.2). We included a further detailed characterisation in Annex 2. A CIMM is developed every year and a half in the defined 1980-2022 timeframe denoting the longitudinal importance of the topic. The CIMMs have 4,1 levels (computed for staged maturity principle) and 6,4 dimensions on average. They are primarily qualitative, based on case studies or surveys, and focused on assessing and improving the CI function or programmes. Only one CIMM (M-Brain et al., 2019) is motivated by increasing the performance of organisations, which is the ultimate purpose of CI (Madureira et al., 2021a, 2021b).

Table 5.2 – Detailed characterisation of included CIMMs (developed by the authors)

(Authors, Year) Citation	Name of the CIMM	Dimensions	Maturity Principle	Number Of Audiences	Assessment Approach	Study / Report	Motivation
(Calof, 1998)	Competitive Intelligence Quotient (CIQ)	Multi-dimensional: 4	Continuous to Maturity (WCCI)	Multiple	Qualitative	Report	Economic Policy

(Marceau & Sawka, 1999)	World-Class CI Program in Telecoms (WCCIP-T)	Multi-dimensional: 5	Continuous	Single (Telecom)	Qualitative	Study of Telecoms practices	CI Program development framework
(Prescott, 1999)	Action-Oriented CI Program (AOCIP)	Multi-dimensional: 5 + 5	Staged: 4	Multiple: Proposal Management Professionals focus	Qualitative	Report based on APQC 1997 Best Practices study	Improve CI effectiveness
(West, 2001)	CI Stages of Development (CISoD)	Multi-dimensional: 4	Staged: 3	Multiple: European focus	Qualitative	Report	CI usage development
(APQC et al., 2004)	FIICH Model (FIICH)	Multi-dimensional: 5 + 21	Staged: 4	Multiple	Qualitative	Study of CI best practices	Guide CI efforts leveraging empirical best practices
(J. P. Herring & Leavitt, 2011)	CI Maturity Matrix (CIMMx)	Multi-dimensional: 5	Staged: 5	Multiple	Qualitative	Case Study	Implement and develop CI best practices
(Comai & Prescott, 2007)	World Class CI (WCCI)	Hierarchical: 9 + 48	Continuous: 1-5	Multiple	Mixed. Mostly Quantitative	Study	Identify the Dimensions, Level and Drivers for WCCI
(Singh et al., 2008)	Roadmap for Enduring CI Success (RECIS)	Multi-dimensional: 11	Staged: 4	Multiple. Additional focus on Pharma	Qualitative	Study based on Worldwide CI Survey	Ensure CI success
(Heppes & Du Toit, 2009)	CI Function Maturity Level (CIFML)	Multi-dimensional: 8	Staged: 3	Single (Banking)	Qualitative	Case Study	Establish the CIF maturity level within a South African retail bank
(J. P. Herring & Leavitt, 2011)	World-Class CI Program Roadmap (WCCIPR)	Multi-dimensional: 4	Staged: 3	Multiple	Qualitative	Report	Show CIF evolution and promote Organisational Learning
(Hedin et al., 2014)	World Class MI Roadmap (WCMIR)	Multi-dimensional: 6	Staged: 5	Multiple	Mixed. Mostly Quantitative	Report based on own global survey	Guide the development of the CI function
(Oubrich et al., 2018)	Competitive Intelligence Maturity Model (CIMM-M)	Multi-dimensional: 6	Staged: 3	Multiple. Focused on Morocco.	Mixed. Mostly Quantitative	Report based on own local survey	Identify the purpose and propose a CIMM to assess Morocco CI practices
(M-Brain et al., 2019)	M-Brain - World-Class Intelligence Framework (WCIF)	Multi-dimensional: 9	Staged: 5	Multiple	Mixed. Mostly Quantitative	Report based on own global survey	Help organisations improve business performance

(Alvares et al., 2020)	Organisational Intelligence Maturity Model (OIMM)	Hierarchical: 2 + 17	Staged: 6	Multiple	Qualitative	Report	Understand, implement, improve, benchmark or self-assess IM, KM, or CI models.
------------------------	---	----------------------	-----------	----------	-------------	--------	--

5.3.3. CIMMs benchmark vis-à-vis the CI 5Ps and descriptors

We analysed and compared the content of the selected CIMMs vis-a-vis the dimensions (5Ps) and descriptors of the CI unified view and modular definition scientifically validated by Madureira et al. (2021a, 2021b). As such, the visual abstract of the paper (Madureira et al., 2021a) provided a standardised meta-model (Lahrmann & Marx, 2010) for content analysis (conceptualisation, codebook creation, coding, refinement, and reliability check), guaranteeing the scientific rigour of the classification process (Neuendorf, 2019). Furthermore, the Webster & Watson (2002) conceptual-centric approach allows for the comparison between the CIMM's meta-model (dimensions and aspects) and the 5Ps (Purpose, Purview, Practices, Process, and Product) and underlying descriptors – Table 5.3. In its preparation, we paid particular attention to three potential issues. First, synonymy – different names for the same dimension/aspect. Second, polysemy – same name but meaning different dimensions/aspects. Last, homonymy – similar names suggesting similar dimension/aspect but effectively meaning different dimensions/aspects. Additionally, we needed to make several assumptions:

- the tools and techniques can refer to the Process or the Product dimensions – e.g., Analysis of Competing Hypothesis (ACH) can either refer to the technique used in the process of analysis or the product of such analysis, the CI deliverable;
- that we correctly empathised with the meaning the author intended to convey from reading the original article;
- that some CIMM dimensions need to be split (hence appearing in two or more columns in Table 5.3 below) for two reasons:
 1. CIMMs included aspects that correspond to different benchmarked dimensions (Madureira et al., 2021a) – e.g., the "strategic significance" dimension from Comai & Prescott (2007) has aspects of three of the 5Ps, Purpose (usage in strategy development), Purview (focus on the strategic scope), and Practices (CI is included in the corporate strategy statement);
 2. they refer to various dimensions or aspects in different maturity levels.

Table 5.3 – Integration and benchmark of included CIMMs vis-à-vis the Unified View and Modular Definition of CI (Madureira et al., 2021a)

(Authors, Year) Citation	Name of the CIMM	CI Dimensions and (aspects)					Model Maturity Levels
		Purpose	Purview	Practices	Process	Product	
(Calof, 1998)	Competitive Intelligence Quotient (CIQ)		Activities (scope)	Style Resources	Activities (reporting, sources)	Tools	1. Infancy 2. Maturity/World Class
(Marceau & Sawka, 1999)	World-Class CI Program in Telecoms (WCCIP-T)	Decision-support (opportunities) Culture (early warning)		Process (interface, location) Culture (info sharing)	Process (key activities, interface) Decision-support (options) Technology (storage)	Decision-support (portfolio, tools techniques) Technology (infrastructure)	World Class (continuous)
(Prescott, 1999)	Action-Oriented CI Program (AOCIP)	Focus		Location & structure (personnel) ethics	Location & structure (network) Projects	Products (TAR)	1. Gathering 2. Industry & competitor analysis 3. Strategic decision making 4. Core capability
(West, 2001)	CI Stages of Development (CISoD)	Applications (anticipation)		Organisation Applications (curiosity)	Data Collection	CI Systems	1. Aware 2. Sensitive 3. Intelligent
(APQC et al., 2004)	FIICH Model (FIICH)	Change (performance) Focus (goals & objectives)		Implement Institutionalise Change (behaviour)	Hone Change (process)		1. Prestart-up 2. Start-up 3. Established 4. World Class
(J. P. Herring & Leavitt, 2011)	CI Maturity Matrix (CIMMx)	Processes (aligned)		Teams Tools (Training) Processes (culture, ethics, legal)	Processes (gathering, cyclic) Techniques (KITs, Sources, Analytical)	Products Tools (Techniques, tools)	1. Ad-hoc 2. Emerging 3. Defined 4. Institutional 5. Optimised
(Comai & Prescott, 2007)	World Class CI (WCCI)	Strategic significance CI in SBU (vision)	Project selection Strategic significance	Human resources Evolution Governance Culture Process (protocol) Resources (financial)	Projects Process (sub-processes) CI in SBU (procedure, governance)	CI in SBU (portfolio) Resources (system, software)	1. Not started 2. Some progress 3. Still a lot to do 4. Nearly achieved 5. Fully achieved
(Singh et al., 2008)	Roadmap for Enduring CI Success (RECIS)			People Analysis (capability) Professionalism Organisational structure Roles & responsibilities Awareness Value perception	Processes Research Analysis (insight)	Technology	1. Stick fetching 2. Pilot 3. Proficient 4. World Class

(Authors, Year) Citation	Name of the CIMM	CI Dimensions and (aspects)					Model Maturity Levels
		Purpose	Purview	Practices	Process	Product	
(Heppes & Du Toit, 2009)	CI Function Maturity Level (CIFML)	Relationship w/ management (strategy, early warning, opportunities) Deliverables (strategy)		Relationship w/ management (C-suite) Staffing Skills & training	Relationship w/ management (decision) Capabilities Analytical products Sources of Information Info requirements	Deliverables	1. Early stage 2. Mid-level 3. World Class
(J. P. Herring & Leavitt, 2011)	World-Class CI Program Roadmap (WCCIPR)	Policies (mission, alignment) Uses (strategic planning, strategy, benchmark) Methods (early warning, threats)		Professional development Policies (governance, mission) People Users (training) Methods (future studies) Uses (long-range planning)	Processes (CCI) Procedures (KITs) Methods (sub-processes) Users (networks) Sources	Users & uses (products) Methods (products, expert systems, software) Processes (value added)	1. Developmental 2. Professionalisation 3. Optimisation
(Hedin et al., 2014)	World Class MI Roadmap (WCMIR)	Scope (purpose)	Scope (macro, meso, user groups)	Organisation Culture	Process Tools (templates, techniques)	Deliverables Tools (CI system)	1. Firefighters 2. Beginners 3. Coordinator 4. Directors 5. Futurists
(Oubrich et al., 2018)	Competitive Intelligence Maturity Model (CIMM-M)	Impact	Relationship w/ management (functions)	Resources Structure Strategy & culture	System Analytical Deliverables Capabilities CI Use Relationship w/ management (actionable)		1. Early stage 2. Mid-level 3. World Class
(M-Brain et al., 2019)	M-Brain - World-Class Intelligence Framework (WCIF)	Leadership Scope (strategic objectives, opportunities, early warning)	Scope (external environment)	Organisation Culture Management Scope (forward-looking)	Process Stakeholders Digitalization	Deliverables Tools	1. Informal 2. Basic 3. Intermediate 4. Advanced 5. World Class
(Alvares et al., 2020)	Organisational Intelligence Maturity Model (OIMM)			Org. learning (capability) Org. capabilities Org. memory (capability) Spaces Info. policy Culture Individual Vision Env. scanning (practice)	Env. scanning (process) Storage, search, recovery Sharing & re-usage Usability (use) Org. memory (storage) Security Org learning (process)	Knowledge value Knowledge and info processes Intel. reports Usability (system) Technology	1. Initial 2. Intermediate 3. Advanced

(Authors, Year) Citation	Name of the CIMM	CI Dimensions and (aspects)					Model Maturity Levels
		Purpose	Purview	Practices	Process	Product	
CIMMs w/ dimension	Σ	11	5	14	14	12	
Dimension Alignment	%	78,6%	35,7%	100%	100%	85,7%	Average Levels: 3,9
Aspects average alignment	%	30,0%	11,9%	42,9%	33,8%	31,3%	
(Madureira et al., 2021a)	Competitive Intelligence Unified and Modular Definition (adapted from Visual Abstract for benchmarking)	Performance Decision (specific goals, competitive advantage, early warning)	Competitive environment External (macro, meso, micro) Internal (org. functions)	Org. practices Capabilities (individual, organisational, structure, policies, mindset, culture) Orientation (time horizon)	Activities Procedure (processes, characteristics)	Knowledge Nature (augmented, machine, human) Outcome (knowledge management, characteristics)	Total Benchmarked Aspects: 33

5.4. DISCUSSION OF FINDINGS

The following sub-sections detail the findings from the integration and benchmarking exercise from the previous section. We start at the dimensional level and then go deeper into the aspects. Finally, we discuss the CIMMs, the implications of the findings, our recommendations for implementation and the limitations of the study.

5.4.1. Dimensions level

An evident gap in the results is that, as with any strategy (Rumelt, 2012, 2022), the underlying reason for the CI efforts should be the starting consideration. However, despite the need for CI practitioners to start with the end in mind, the CI Purpose dimension is the second least addressed in identified CIMMs.

A second finding is that only five CIMMs include the CI Purview dimension and aspects. The scope is critical for the CI practice as it defines the focus and conditions the effectiveness of the activities. It is impossible to develop intelligence for the entire CI scope. In an information-overloaded world, CI professionals must trade off the amount of Big Data (Laney, 2001) processed vis-à-vis the (lack of) computing power and the available headspace. The considerable stream of research on Key Intelligence Topics (KITs) is proof of the importance and the guidance of this topic (J. Herring, 2008; J. P. Herring & Leavitt, 2011).

Surprisingly, all CIMMs address CI Practices despite being the least mentioned dimension in the 816 definitions used in developing the benchmarked definition (Madureira et al., 2021a). The importance of the CI Practices for the CIMM is evident since it materialises the concept. The Practices and Process dimensions form the core of the CI model, reinforcing each other in implementing CI effectively. The CI function location in the organisational structure (Calof, 1998; Comai & Prescott, 2007; J. P. Herring & Leavitt, 2011; Marceau & Sawka, 1999; Singh

et al., 2008), the policies (namely the importance of respecting the legal and ethical aspects (J. P. Herring & Leavitt, 2011; Prescott, 1999), the capabilities of the organisation and the individual (Alvares et al., 2020; Comai & Prescott, 2007; Oubrich et al., 2018), the mindsets (APQC et al., 2004; Calof, 1998; Comai & Prescott, 2007; West, 2001), and the culture of intelligence (Alvares et al., 2020; Hedin et al., 2014; M-Brain et al., 2019; Oubrich et al., 2018), are the most appointed key success factors in the CIMMs for the development and evolution of CI (Adamala & Cidrin, 2011; Nasri & Zarai, 2013; M-Brain et al., 2019; Marceau & Sawka, 1999).

There is no surprise, though, in the complete alignment between the CIMMs and the CI Process dimension, given that it provides the blueprint for the CI activities performed and overall output.

The lower level of alignment (85,7%) towards the CI Product dimension is somehow more problematic given the importance the quality of CI has on decision-making, which in turn profoundly impacts the performance of organisations.

5.4.2. Aspects level

An in-depth analysis of the aspects (and sub-aspects) evidence a high synonymy, polysemy, and homonymy. Navigating the meaning of the aspects across CIMMs is extremely difficult given its number, the diverse nomenclature used, and the longitudinal evolution of the CI construct (Prescott, 1999). It is almost impossible to benchmark the maturity level between CI functions, programs, organisations, industries or countries using different CIMMs. Therefore, there is a clear need for a unified reference model with standardised nomenclature of dimensions and aspects.

Another important finding is the different levels of the thoroughness of the CIMMs regarding the aspects. On average, for any given dimension, the CIMMs do not address half of the aspects of the unified view of CI. Again, this reinforces the need for a holistic go-to CIMM with a solid scientific base that executives and academics can rely upon in theory and praxis.

5.4.3. CIMMs

A significant finding is that only one CIMM covers the 5Ps. This insight highlights the relevance of this study, addressing the research gap for a go-to CIMM of reference and delivering on the expected contributions. Moreover, by benchmarking the best theoretical and empirical CIMM knowledge vis-a-vis a unified and scientifically validated definition of CI (Madureira et al., 2021a, 2021b), we bring a solid foundation and scientific rigour to the CI practice, the broad-spectrum CI audiences, and the related disciplines. The findings also contribute to establishing CI science, as an integrated scientifically developed UCIMM will make the practice more scientific, repeatable, and comparable between organisations and industries. On top, none of the literature from the included CIMMs refers to the order of implementation of the 5Ps. Nor are the criteria for dimension selection, exceptions for best practices, or findings from case studies and empirical surveys. The level of arbitrariness can

be considerable and dependent on the scope – specific country, industry, or organisation under analysis.

Overall, the findings highlight the essential contributions of the study. Firstly, all the dimensions and aspects included in the CIMMs fit within the CI unified view and modular definition (Madureira et al., 2021a). Nevertheless, there are still descriptors of the CI definition not addressed by aspects in any of the maturity models studied. Consequently, integrating the missing aspects into a CIMM will guarantee that professionals do not oversee any critical aspect and a sound grounding in CI theory. Secondly, there is the need for a more manageable CIMM. Assessing more than five dimensions can be burdensome for practitioners in a more pragmatic business setting. Conveying the results to the top management is also more difficult as the number of dimensions increases. This miscommunication with top management can endanger the allocation of further needed resources for CI, endangering its development. As such, the hierarchical structuring of all the aspects into five dimensions seems to be a valuable empirical and theoretical contribution. Therefore, given previous CIMM shortcomings, we propose a unified CIMM in the next section.

5.4.4. Integration of CIMMs into a proposed UCIMM

We used the Capability Maturity Model Integration (CMMI) developed by the Software Engineering Institute at Carnegie Mellon University to integrate the CIMMs (ISACA, 2022). This process and behavioural model, designed to improve the performance of organisations, share the exact purpose of CI (Madureira et al., 2021b), hence our preferred choice. The model aims to combine multiple business maturity models into one framework, thus additionally addressing the challenge identified in Section 5.4.3. A model is a tool for streamlining process improvement by developing measurable benchmarks and creating a structure for encouraging productive, efficient behaviour throughout the organisation, functions, and projects. Therefore, it leverages the established standards for vetting vendors and suppliers, identifying and resolving process issues, and minimising risk while building a corporate culture that supports the new integrated model. In addition, the maturity and capability levels of an organisation provide a way to characterise its capability and performance.

5.4.4.1. Maturity Levels (ML)

MLs represent a staged path for the organisation to improve the performance and processes efforts based on predefined dimensions and aspects. Within each ML, the dimensions and aspects also provide a path to performance improvement. Each ML increments the previous by adding new functionality or increased rigour. The goal is to raise the maturity of the organisation to the highest ML. Once reached, organisations should focus on maintenance and regular improvements, a learning organisation.

The journey starts at ML0 – *Incomplete* – where CI work may or may not get completed. CI goals are not established, and the processes are partly formed or do not meet the needs of the organisation. In ML1 – *Initial* – CI processes are viewed as unpredictable and reactive. CI

work gets completed, but it is often delayed or over budget. This is the worst level for an organisation facing an unpredictable environment that increases risk and inefficiency. In ML2 – *Managed* – organisations achieve the project management level. Projects are planned, executed, measured, and assessed, but many issues remain unaddressed. In ML3 – *Defined* – organisations are more proactive than reactive. A set of organisational policies and standards guide projects, programs, and portfolios. Organisations know their shortcomings, how to overcome them and the objectives for improvement. In ML4 – *Measured* – the organisation starts to measure and control the business, working off quantitative data to determine predictable processes aligned with stakeholder needs. The organisation manages risk with insight-driven process deficiencies. Lastly, in ML5 – *Optimised* – the organisation processes are stable, flexible, and agile. The learning organisation status is achieved with continuous improvement and responding to changes or other opportunities in an innovative and agile way. ML4 and ML5 are considered high maturity and stakeholder and customer-centric.

5.4.4.2. Capability Levels (CL)

CLs are used to evaluate the CI process improvement and performance of the organisation. They bring structure to the process and performance improvement. Each CL builds on the last, in the same fashion as MLs, for appraising an organisation. The CLs range from CL0 – *Incomplete* – with inconsistent performance and incomplete approach to achieving the intent of CI. In CL1 – *Initial* – organisations address performance issues in specific activities, but there is not a complete CI practice in place. CL2 – *Managed* – there is a complete set of procedures that result in CI practice improvement. Finally, in CL3 – *Defined* – the focus is on achieving project and organisational performance objectives with clear organisational standards for managing CI projects.

5.4.4.3. Dimensions and Aspects

Based on the finding from Section 4.3 that some aspects are present but do not thoroughly cover all the relevant descriptors from Madureira et al. (2021a), we focused on adding the missing aspects to the UCIMM. Furthermore, given that the 5Ps and their descriptors are empirically proven, the outcome is a hierarchical catalogue (cf. Figure 5.3) of mutually exclusive CI maturity dimensions covering all aspects replicating the benchmarked visual abstract (Madureira et al., 2021a).



Figure 5.3 – UCIMM hierarchical meta-model – dimensions, aspects, and sub-aspects
(adapted by the authors)

5.4.4.4. The proposed UCIMM

The UCIMM proposed comprises five levels of maturity, three levels of capability, five dimensions, eight aspects, and sixteen sub-aspects. The UCIMM is multi-dimensional, hierarchical, staged, primarily qualitative and built on the integration of previous studies.

Table 5.4 – The UCIMM prepared by the authors builds on the unified view of CI (Madureira et al., 2021a)

Name of the CIMM	CI Dimensions and (aspects)					Model Maturity Levels
	Purpose	Purview	Practices	Process	Product	
Unified Competitive Intelligence Maturity Model (UCIMM)	Performance	Competitive environment	Org. practices		Knowledge	Proposed
	Decision	External (macro, meso, micro)	Capabilities (individual, organisational, structure, policies, mindset, culture)	Activities	Nature (augmented, machine, human)	Maturity Levels
	competitive advantage, early warning)	Internal (org. functions)		Procedure (processes, characteristics)	Outcome (knowledge management, characteristics)	0. Incomplete
						1. Initial
						2. Managed
						3. Defined
						4. Measured
						5. Optimised

Following, we propose four integrated graphical visualisations (Figures 6.4-6.7) and their explanation to guide and help CI professionals implement the UCIMM in practice.

5.4.4.5. CI Purpose

CI aims to create value by addressing its stakeholder needs in a unique and superior way vis-a-vis its competitors. As such, organisations must continuously make decisions to adapt to the evolving context and stakeholder needs and wants. Stakeholder centricity is pivotal to guaranteeing that the value created is superior to the value provided by competitor organisations at any time. Optimised CI organisations support specific strategic, tactical, and operational decisions, help develop competitive advantages and provide early warning to decision-makers. Thus, the critical constructs are adaptation, agility, and anticipation.

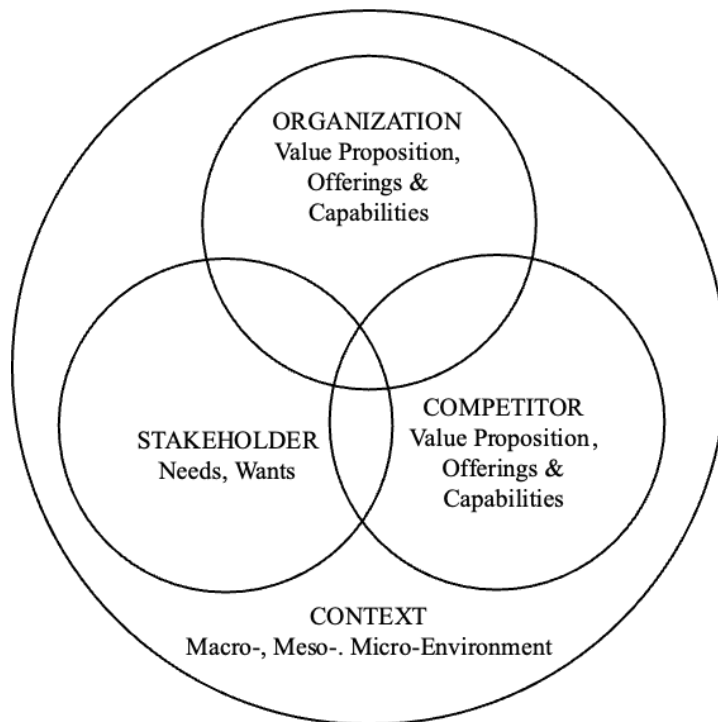


Figure 5.4 – CI Purpose (developed by the authors)

5.4.4.6. CI Purview

The scope of CI is the entire competitive environment (Figure 5.5). It encompasses the macro forces (macro-environment – outer arrows), the market forces (meso-environment – dashed triangle), the industry forces (microenvironment – industry (Porter, 2008)), and the internal environment (inside the organisation – players). Therefore, given its wide dimension, aligning the scope addressed by the CI function with the purpose of the organisation is paramount. Most notably matching the scope to the maturity level of the CI competencies. An eventual mismatch affects the quality of CI, leading to sub-standard decisions and ultimately jeopardising the overall performance. Therefore, the CI practice must start small and increase the scope as its resources and competencies develop.

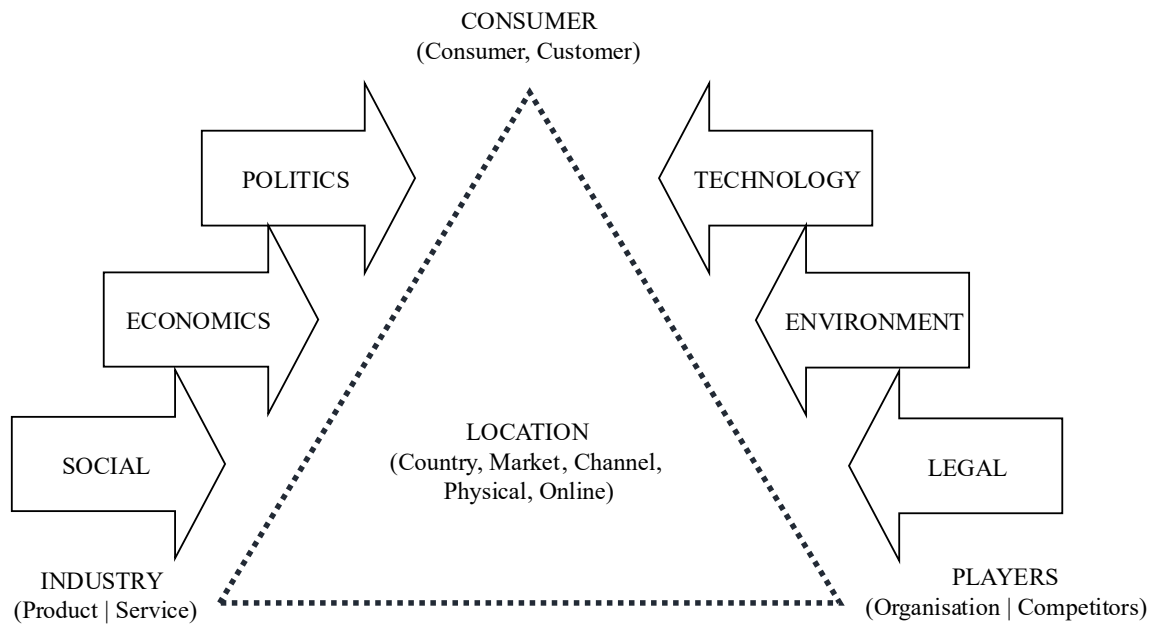


Figure 5.5 – CI Purview (developed by the authors)

5.4.4.7. CI Practices and Process

The Core CI Model results from integrating the CI Practices and Process dimensions. Process-wise, learning organisations continuously adapt and improve their processes, tools, and techniques to support high-quality decision-making. The activities in the middle concentric circle (Figure 5.6) are guided by the CI procedure and executed with project management proficiency. The CI practice (and performed activities) depends on soft and hard factors: the place it occupies in the organisational structure, the policies that guide its execution, the mindsets, and the intelligence culture. The time orientation also impacts CI activities. Understanding the past is not enough; understanding the present may not be possible without considering the past, and anticipating the future is impossible without previous time horizons. Organisations optimising CI are forward-looking, integrating the different time horizons synergically to create a new official future (Wilkinson & Kupers, 2013). In a nutshell, CI needs to be an established support activity within the value chain of the organisation.

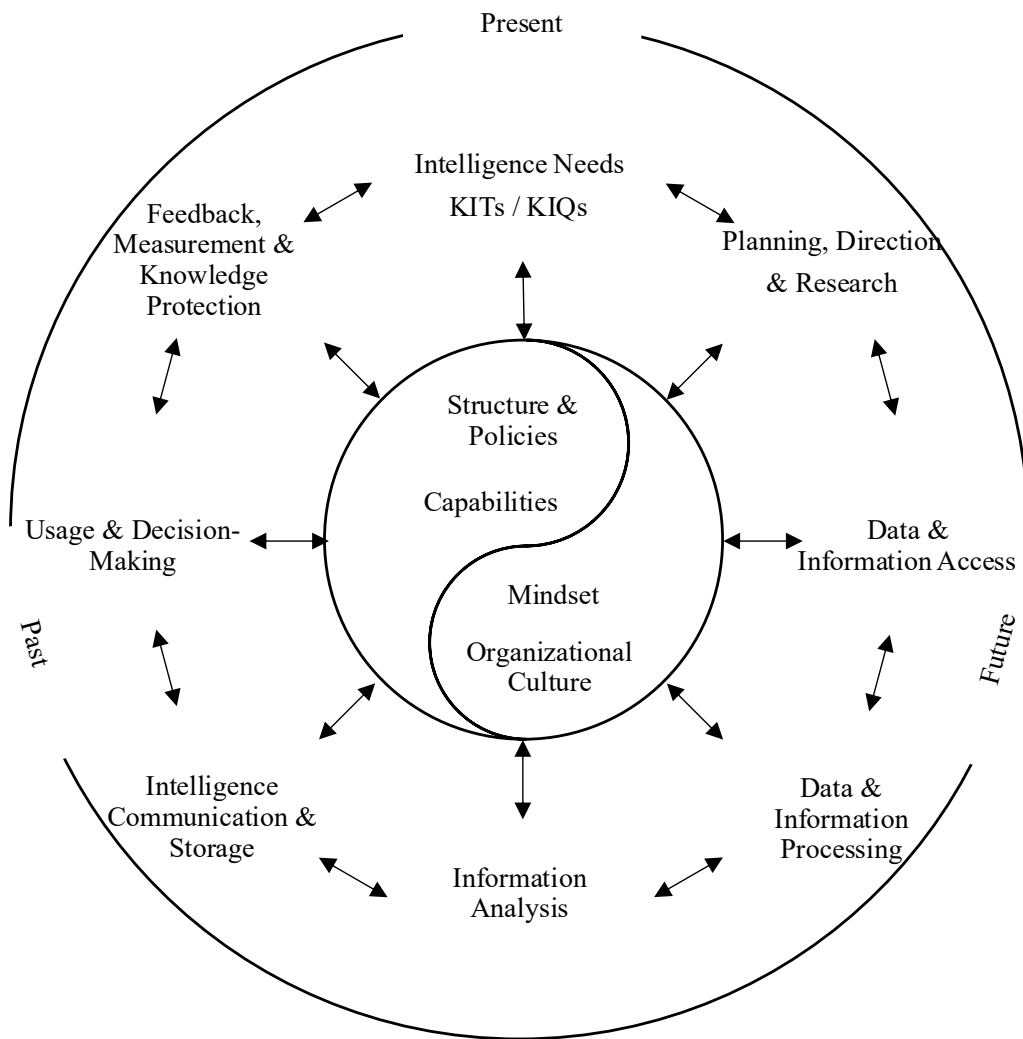


Figure 5.6 – Core CI Model: Practices and Process (developed by the authors)

5.4.4.8. CI Product

The output of CI outcome is a set of artefacts (deliverables, systems, or projects) produced for a given purpose, within a specific scope, through a systematic process, and a defined set of practices. Given the need for anticipation, organisations must act on quality intelligence – meaning the actionable insights will be verified true (converted into knowledge) or allow for creating an official future (Wilkinson & Kupers, 2013). Despite knowledge being the desired output, if an organisation waits for the insights to be verified true (e.g., a merger between two competitors), it will lose its opportunity to influence the competitive outcome. As such, CI has no value if the decision-makers receive factual truths. They need actionable insights.

Moreover, the CI functions will derive learnings from using such intelligence and converting them into wisdom. The knowledge and wisdom of today are the data points of tomorrow, allowing CI practitioners to develop new higher-order intelligence. An increasingly important factor is the augmentation of artificial intelligence by CI professionals to guarantee reduced

time to insight and overall timeliness of deliverables. Therefore, the CI function must not limit itself to data science or information management and should leverage knowledge management to become a learning organisation (Alvares et al., 2020).

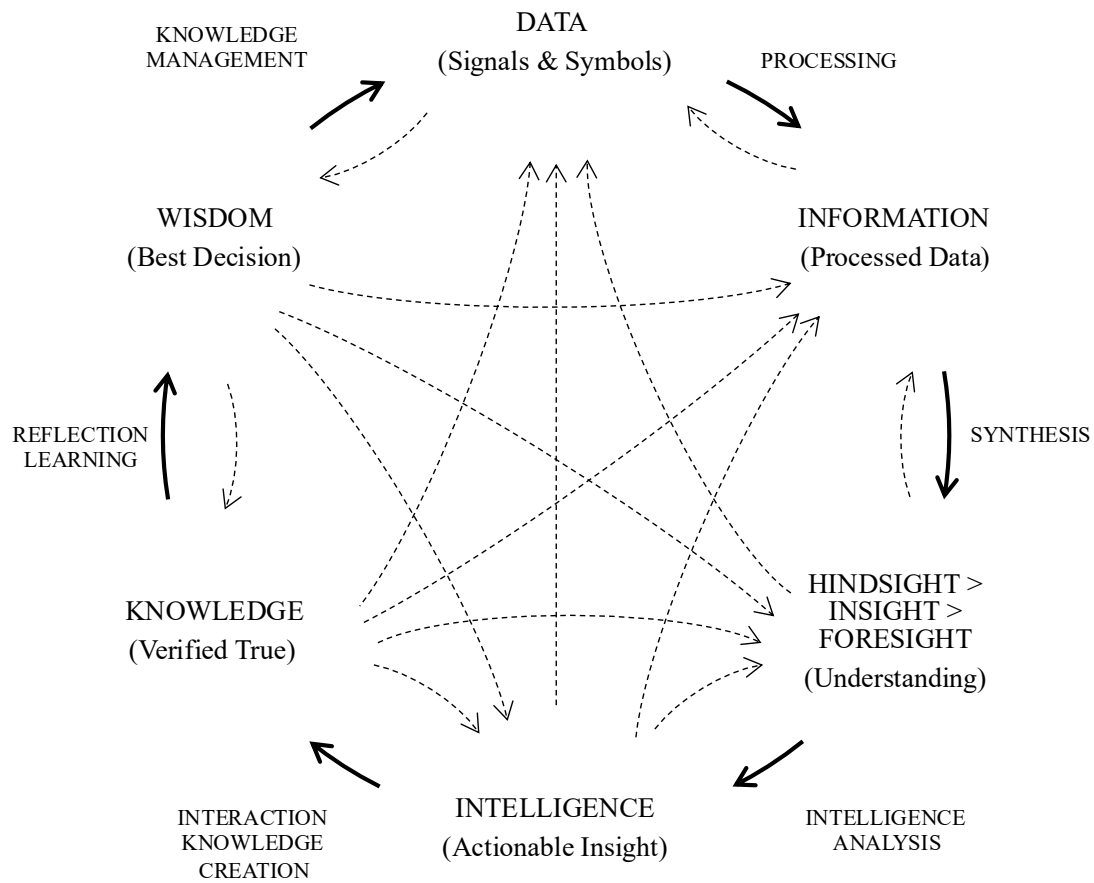


Figure 5.7 – CI Product (developed by the authors)

5.4.5. Limitations and future research

We purposely limited the study to CIMMs and excluded models focusing on CI subdomains, such as Business Intelligence MMs, Artificial Intelligence MMs (AIMMs), or Capability MMs. The specific models can thus be integrated for a more thorough and granular assessment, guidelines, and evolutionary path. Namely, AIMMs can be a fruitful and valuable research avenue, given the need for guidance in this newer field within CI. Another research path is the empirical validation of the proposed model, the UCIMM. To this end, developing a scientifically validated scale would be essential.

5.5.CONCLUSION

The study successfully addressed the need to develop a UCIMM for effective practical guidance addressing the conflicting interests of academics, executives, practitioners, and vendors. This study adds to existing theory by synthesising the current CIMMs literature, serving as a future reference for all CI stakeholders. More prominently, it expands CI theory

with the first ever integrated CIMM based on a scientific and empirically validated definition of CI. Furthermore, it contributes to practice by identifying gaps in existing CIMMs dimensions and aspects, providing a thorough and scientifically sound UCIMM. The model allows practitioners to pinpoint and address the areas they need to improve. The accompanying frameworks support a better assessment, implementation, and development of the CI practice in organisations, navigating the adverse impacts of continuous change. Higher quality CI – timely, actionable, accurate, relevant (TAR) (Prescott, 1999) – should result in better decision-making and improved performance of organisations. On becoming a reference model, the UCIMM will save time while guiding the effectuation of CI construct and practice, functions, systems and programmes in surpassing the average and reaching the world-class optimised level of maturity.

5.6. DECLARATIONS

5.6.1. Author Contributions

Conceptualisation, LM, AP, and MC; methodology, LM; formal analysis, LM; investigation, LM; resources, LM; data curation, LM; writing—original draft preparation, LM; writing—review and editing, LM, AP, and MC; visualisation, LM; supervision, AP, and MC; project administration, LM, AP, and MC; funding acquisition, AP and MC. All authors have read and agreed to the published version of the manuscript.

5.6.2. Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the Slovenian Research Agency (research core funding) [P5–0410]. This work was supported by national funds through FCT (Fundação para a Ciência e a Tecnologia), under the project UIDB/04152/2020 - Centro de Investigação em Gestão de Informação (MagIC)/NOVA IMS.

5.6.3. Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies, have been completely observed by the authors.

6. DESIGN THINKING: THE NEW MINDSET FOR COMPETITIVE INTELLIGENCE?

6.1. INTRODUCTION

In an increasingly VUCA world, CI is of vital importance to Business as it enables superior Firm Performance (Yap et al., 2018). It does so by providing actionable insights on the competitive environment, allowing companies to make the best possible decisions and position themselves successfully (Rothberg & Erickson, 2017). The process of developing such insights in use to this day is the Intelligence Cycle, imported from the Intelligence Services in the 1960's (Zlotnick, 1964). The Intelligence Cycle is flawed mainly due to several factors, such as the breadth and complexity of intelligence needs, their clear articulation by the decision-maker, the completion and sequential nature of the cycle, the reliance on CI practitioners to run it (McGonagle, 2007; Tropotei, 2018), and the capability to deliver timely insights given the environment exponential speed of change (Calof, Santilli, et al., 2017). In a nutshell, companies are struggling to orient themselves in search of sustained performance while CI practitioners still rely on an outdated and flawed CI process – the Intelligence Cycle – which is not fit for purpose anymore (K. Wheaton, 2012; Tropotei, 2018). The generalised gap in the qualified training (Fleisher, 2004; Jin & Bouthillier, 2012; Sidak et al., 2018) in university programs, coupled with vague role requirements and job descriptions, results in further ambiguity on how CI should be performed, attributing the stature of Rock Stars to those who master it. Solving problems by using a designer's mindset, or DT, has become increasingly popular in many professions, most notably in Business (Martin, 2009a). Roger Martin, one of the world's top management thinkers – Thinkers50 #1 in 2017 – and former Dean of Rotman School of Management, argues that to be successful in the future, business people need to become more like designers (Brown, 2009, p. 37) – more 'masters of heuristics' rather than 'managers of algorithms' (Martin & Christensen, 2013). Thus, given the growing importance of the CI, the pivotal role of the Intelligence Cycle, and the need for CI practitioners and businesspeople to think like designers, it is highly relevant to research how DT can improve the CI process fit for purpose, solving or mitigating existing pitfalls, benefiting CI practitioners and organisations in search for the increase and sustained performance.

Prior research shows that CI has grown in importance over the last decades. Before the 1980s, CI was focused on competitive data gathering, changing to Industry and Competitor Analysis (Porter, 1980) during the 1980s, then on supporting Strategic Decision Making during the 1990s, then as a Core Capability with advances in both Business and Scientific Research (Prescott, 1999; Marcial, 2018). Most recently, research is focused on the development of infrastructures for multinational organisations as well as on leveraging the use of digital, namely Social Media and its analysis for CI purposes (Du Toit, 2015). While prior research has been focused on the Collection and Analysis phases of the Intelligence Cycle, in close parallel to the amount of time practitioners allocate in practice to these

phases (Dishman & Calof, 2008), little or no attention has been paid to how efficiency can be improved in the remaining phases of the Intelligence Cycle, namely in Planning, Communication, and Usage phases, as well as in the overall cycle itself. Considering that the CI process works with relativistic, complex, dynamic social constructs and problems which impact its outcome (Du Toit, 2015), and there seems to be no research on how DT as a human-centred problem-solving approach could eventually help the CI process address these issues, it is paramount to do so.

This paper intends to study the potential for the application of DT mindset and guidelines (Carlgren et al., 2016) as a way to solve the identified shortcomings and pitfalls in the CI process (K. Wheaton, 2012; Fleisher & Bensoussan, 2015; Calof, Richards, et al., 2017; Tropotei, 2018), both on each individual stage and as a whole. The research question is, thus, how the DT mindset can be used to improve the CI model.

The main expected contribution of this exploratory study is the application of the DT mindset to the Intelligence Cycle as a means to improve CI's outcome, application, and impact on Firm Performance. The findings are expected to expand both CI and DT theories while creating a new stream of research on the integration of both. Contribution to CI theory results from an improved Intelligence Cycle and CI model. Contribution to DT theory results from its application to a new field, in this case, CI. Contribution to science results from research in the intersection of both. As per the above, the findings are relevant to both CI practitioners, organisations and scholars.

The paper starts by explaining the methodology used, reviewing CI and DT mindset literature, deriving the potential impacts of the latter on CI, and finishing by pointing to further research opportunities.

6.2. MATERIAL & METHODS

This article studies the counterarguments for the current way the Intelligence Cycle is used in the development of CI, both in theory and practice and how a DT mindset can address them to improve the overall CI Model.

In order to determine the main research concepts and methods, a constructivist approach is used. As such, it is assumed that the social realm can be understood, and that there is no single truth. Following this approach, the ontology of this study is subjective, highlighting the fact that understanding and perception are used to filter the actual reality. The epistemology of this research, which is interpretative, aims not only to explain the studied phenomenon but also to frame it within an overarching comprehensive framework, integrating theories, paradigms, and several research from both fields of study. From this perspective, the methodology is qualitative.

Information for this study was collected through a thorough analysis and review of academic literature (to which it was given preference), industry research, and professional first-hand experience.

The methods used can be summarized as follow, with more detailed sources listed in the References section: 1) literature review of published scientific papers on the subjects of CI and DT using Google Scholar and search terms such as ‘Competitive Intelligence Process’, ‘Competitive Intelligence Model’, ‘Competitive Intelligence Cycle’, ‘Competitive Intelligence Literature Review’, ‘Competitive Intelligence Challenges’, ‘Design Thinking’, ‘Design Thinking Mindset’, ‘Design Thinking Process’, ‘Design Thinking Applications’, and ‘Research Flaws’, ‘Intelligence Cycle pitfalls’, supported by the usage of the Boolean operators such as “ “ and AND; 2) review of content published by subject matter experts at highly-regarded institutions such as Stanford D School, IDEO, and Rotman on Design; and 3) Review of concepts in renowned books on the topics including ‘Change by Design’ (Brown, 2009), ‘Thoughts on interaction design’ (Kolko, 2011), ‘The Design of Business: Why Design Thinking is the Next Competitive Advantage’ (Martin, 2009a).

6.3. COMPETITIVE INTELLIGENCE MODEL

6.3.1. Competitive Intelligence

One cannot properly analyse the CI Model without first considering the definition of CI. Since there is a huge number and debate on the definitions of CI (Marcial, 2018), after a thorough systematic literature review, it is chosen to consider two definitions to contextualise CI for the purpose of this paper. The first is from (Kahaner, 1996) and is the most cited CI definition to date according to (Marcial, 2018); the second is the latest attempt to provide a universal definition of CI, accepted by both scholars and professionals developed by (Pellissier & Nenzhelele, 2013b). These definitions assert that CI is a systematic program, practice or process. The process has several phases, with actionable intelligence being its final outcome, but cyclic in nature. Intelligence, not information, is what can be actioned in decision-making and competitive advantage development, which results in improved Firm Performance. In order to provide a working definition for this paper, we opted to define CI as the development of actionable insights on the Competitive Environment for the improvement of Firm Performance.

6.3.2. Competitive Intelligence Projects

There are two different types of intelligence projects: 1) answering Key Intelligence Questions (KIQs); and 2) addressing Key Intelligence Topics (KITs) (J. P. Herring, 1999; Prescott & Miller, 2001). The first is a well-defined question, developed in tandem with the decision-maker, with the objective of reaching an answer quickly to inform a decision to solve a pressing issue. The latter has a broader scope, potentially with no definite answer (e.g., competitor strategy), as it may change over the period of time this CI project is being done to address a strategic decision. KITs are especially challenging to address due to the inherent ambiguity and change posed by the ongoing nature of these projects. For a better

understanding of these challenges and the common pitfalls related to the CI process phases, these are laid out in the following sections.

6.3.3. Competitive Intelligence Process Overview & Potential Pitfalls

According to the previous definitions of CI (Kahaner, 1996; Pellissier & Nenzhelele, 2013b), the intelligence development process phases can go from Planning, to Collection, to Processing, to Analysis, to Dissemination, and Usage of Intelligence by the decision-makers. The number of phases of this process, also known as the Intelligence Cycle, has been evolving through time. (Kahaner, 1996) highlighted its efficiency through the simplicity of just four phases: Planning and direction, Collection, Analysis, and Dissemination. The Central Intelligence Agency (2008) added Processing as an additional phase in-between Collection and Analysis. The most recent models have nine (Pellissier & Nenzhelele, 2013a) and eleven phases (Araujo et al., 2017). This reflects the different and evolving decision-maker and end-user needs, the broader scope of KITs and KIQs, and factors impacting the development of CI.

Given this paper's aim of assessing the impact of DT in the CI model, it was decided to consider the eleven phases, which are described next in more detail, highlighting its characteristics and potential pitfalls. The originating factors of these pitfalls were identified by and McGonagle (2007), Calof, Richards, et al. (2017), Tropotei (2018) as being the breadth and complexity of intelligence needs, clear articulation by the decision-maker, completion and sequential nature of the cycle, reliance on CI practitioners to run it, capability to deliver timely insights given the environment exponential speed of change, as previously mentioned in the introduction section and referred here for convenience. The pitfalls themselves, as well as their application to individual phases, have long been identified by Fleisher & Wright (2010) and Fleisher & Bensoussan (2015) as being problem definition, project planning, data-gathering error, tool- and -technique error, synthesis error, communication transmission or channel error, communication reception error, and unsystematic development. Fleisher & Bensoussan (2015) further highlights that the Intelligence Cycle also struggles with the fact of knowing when to stop one phase and start the next, or another within the cycle, increasing the time to get to the insight and compromising the timely response to intelligence needs. It is, though, critical to study the overall process and its individual phases in detail to understand where it can be improved.

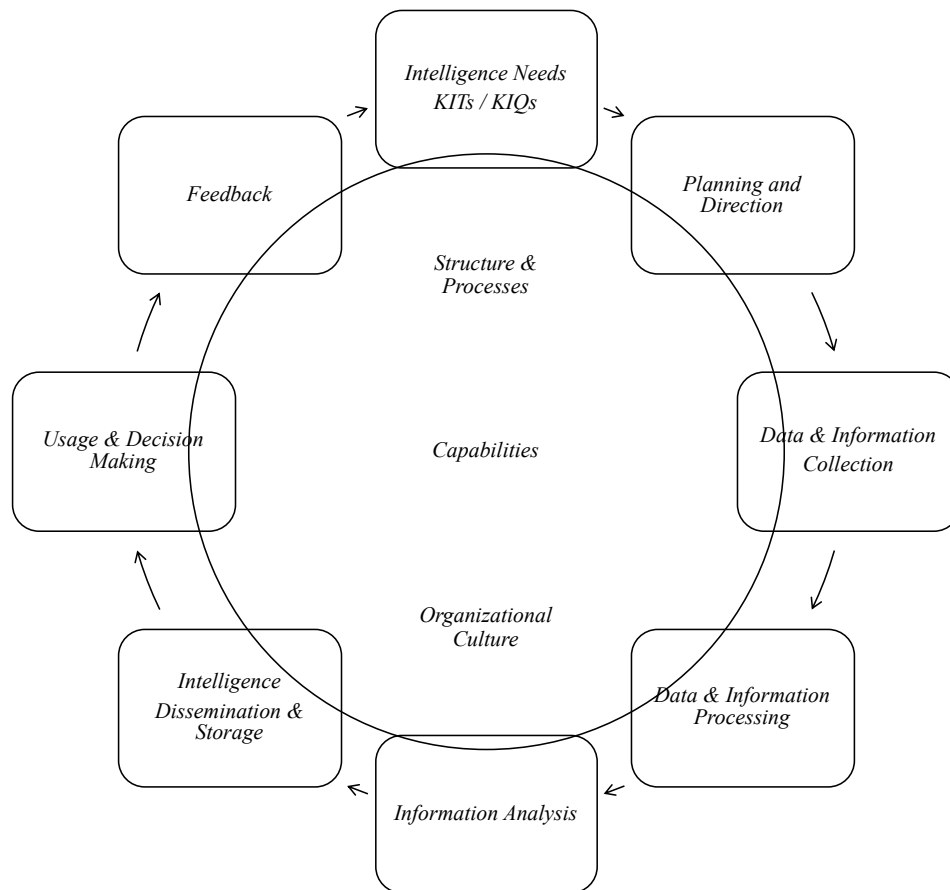


Figure 6.1 – CI Model adapted by the author from (Araujo et al., 2017; Pellissier & Nenzhelele, 2013a)

Determining Intelligence Needs and KITs/KIQs: The first phase is focused on ascertaining which key insights end-users must have in order to make informed decisions. Those needs, sometimes in the form of questions – KIQs, are then grouped into KITs. The outcome of this phase is critical for the CI process and inherently for Firm Performance (J. P. Herring, 1999). In fact, if the produced intelligence does not match end-user needs, it loses its purpose and will not be acted upon. If it is not actionable, then it is not even considered intelligence.

Surprisingly, most CI models and corresponding CI processes do not even consider this stage (Araujo et al., 2017 Table 6.1). CI needs are usually communicated by top management to CI practitioners, hence assumed as a given by the latter. This assumes top management knows their true CI needs, which may not always be the case. Even if they do, they may start with the limitations of the data available in mind, not making the most of CI capabilities. If this phase is not considered in the process, the revision of KITs and KIQs according to the changing competitive environment – a constant in a VUCA world – has no place. Even considering CI needs are right from the beginning, it does not mean they do not need to be reviewed over time during the CI project execution. As such, it requires an ongoing cooperative effort between the producer and end-user to identify the relevant intelligence needs (J. P. Herring, 1999). The same scholar even suggested protocols to facilitate this endeavour arguing for the need for rapport development between both parties, as well as a constant reviewing process of KITs.

Planning and Direction: Some scholars and authors defend this phase as being the most important (Kahaner, 1996; Rouach & Santi, 2001), inclusive for CI practitioners. Once KITs and KIQs are clearly identified, the next step is to plan, allocate resources – people, budget and time – and direct further intelligence activities while maintaining the end-user informed of progress and results. It should also be decided who other potential users are, their need to be informed, and the best deliverable for the purpose of actioning the intelligence (McGonagle & Vella, 1996). Planning for different, varied and complementary sources and recruiting a widespread network of informants throughout the organisation can be a hugely successful strategy to achieve economies of scope – the lower cost and higher quality conclusions resulting from a richer and higher volume of information converging to the CI process (Gilad, 1989). It is of essence not to collect all available data and information but to focus only on critical issues of the highest importance to the senior management (Daft et al., 1988; Gilad, 1989; J. P. Herring, 1998; Viviers et al., 2005). A well-designed plan is a structured, logical, sequential, but adjustable process that clearly defines the relevant information to be collected.

Data & Information Collection: Included activities are the identification of potential sources (primary and secondary), their research, and the ethical and legal gathering of relevant data and information using a considerable number of techniques (J. P. Herring, 1998; Nasri, 2012). (Kahaner, 1996, p. 54) distinguishes different types of sources clearly and concisely: “Primary sources are raw, unchanged, and usually in its entirety, while secondary sources have been selectively pared from other information sources or altered by opinion.” Choosing a particular source is related to the type of information required and factors such as value, scope, relevance, ease of access, ease of processing, cost, availability, quantity and quality of data and information (Wanderley, 1999). Potential sources of information in firms are limited only by the imagination. In fact, a considerable part of the information needed already exists within the organisation. Employees are thus an important internal source (Collins, 1997), and (J. P. Herring, 1998) argues that primary sources are more timely and unique. The great obstacles to accessing this information needed by CI practitioners are the geographic, organisational, and communication barriers within the organisation itself.

Secondary sources are important, namely for validating and identifying relevant primary sources. As such, the capability to gather information from these primary sources is pivotal and most probably will make the difference in the final deliverable. Since the best intelligence mostly relies on nonpublished sources, human intelligence (HUMINT) demands a more detailed analysis. Collection from human sources is highly specialised, and certain basic issues need to be addressed for the purpose of this study. Although the inherent subjectivity, most of the time, this is the only channel to reach information like a competitor’s Management Assumptions (Porter, 1980) or, most importantly, Consumer needs, expectations and behaviours (Brummer, 2005). The entire organisation, including top and Middle Management, the Sales Force, Research & Development, Marketing, Corporate Relations, and whoever has external contact points, should be capable of contributing to the intelligence collection. This requires a proper mindset and training so the critical role of human intelligence ethical and legal collection can be done properly.

Data and Information Processing: In this phase, data and information are organised and systematised, and a mechanism for storing information is implemented and maintained. Cleaning and preparing the data and information is often overlooked in importance. Information stored in electronic format in a database is easier to analyse and to make available to other CI stakeholders (Nikolaos & Evangelia, 2012). Some authors highlight that a CI system should adhere to certain key processes, technology and design requirements (Aaker et al., 2013). It is worth detailing this later set of design requirements for the CI system: simplicity enabling an intuitive method to store, retrieve, and navigate the information and the intelligence development processes; accessibility from any location; security through protecting critical information and allowing for different levels of access; capture internally produced information; and retrievability of relevant and accurate information from both internal and external sources. On top of these, (Prescott & Miller, 2001, p. 152) argues that such a system should be developed from the decision-maker's perspective, which would significantly increase its adoption and usage in decision-making.

Information Analysis: Considered simultaneously the core and most challenging phase (Kahaner, 1996; Rouach & Santi, 2001; Viviers et al., 2005). It relies on the skills of the CI practitioner (Nikolaos & Evangelia, 2012) and answers questions such as “So What?” on collected information on related KITs (Fleisher & Bensoussan, 2015). Data and Information are analysed for patterns and interpreted for hypotheses on their meaning and potential impact on the organisation. This is a collaborative process where CI analyst supports their reasoning in colleagues' expertise to derive meaning. It builds on top of other outputs, such as the Market and Consumer Research (Rouach & Santi, 2001), and most importantly, in tandem with decision-makers to ensure that their intelligence requirements are met and acted upon. The validation of alternative competing hypotheses, as well as the development of high-quality insights, depends on the tools, methodologies and frameworks chosen, as well as their savvy application. It is extremely important that analysts are self-aware of their reasoning process and not just the conclusions they arrive to (Heuer & Pherson, 2016). It is tough a multifaceted, multidisciplinary combination of scientific and non-scientific processes whereby information is interpreted by analysts to provide findings, meaningful insights, and recommendations for action (Fleisher & Bensoussan, 2015). The most common pitfall happens when the CI analyst loses sight of the end goal, produces an outcome that is not immediately actionable or allows his bias to influence analysis.

Dissemination & Storage: This phase is about communicating effectively the right actionable insights, at the right moment and in time, to the right decision-maker, in the right format that is easily understood through a secure means of communication. These communications are in the form of a report, a dashboard, or a face-to-face meeting (Bose, 2008). A vital consideration must be given to the format preferred by the CI end-user. Since 80% of communication is non-verbal, the CI practitioner shall also consider his posture and attitude on delivery. The CI practitioner should also guarantee that the intelligence reaches all relevant stakeholders without compromising the confidentiality and protection of sensitive information. First and foremost, the transmission of intelligence should be done to those with the responsibility and authority to act (Viviers et al., 2005). In any case, actionable insights

must be communicated in time. Otherwise, it may no longer be of added-value intelligence, and kept for future reference or insight development.

Usage and Decision Making: Acting upon insights is the overall purpose of the CI. Intelligence should either allow for an improved and deeper understanding of a KIT, making an operational decision, deploying a tactic, or developing a strategy, resulting in the development of Competitive Advantages that will foster Firm Performance. According to (Eppler, 2003), the quality of the intelligence in this phase can be assessed through the following attributes: applicability – may be actioned and provides added-value; currency – fit for use and not obsolete; interactivity – adaptable to a changing environment; speed –the 'infostructure' is as fast as needed.

Feedback: An overlooked phase where the quality of CI must be evaluated by both the producer and end-user. The objective is to integrate this feedback into new CI projects to increase efficiency further. More than just a phase, feedback is a pre-requisite to be applied to all phases (Rouach & Santi, 2001). An important note must be made on explicit and implicit feedback. CI practitioners must be capable of collecting and integrating current and future projects. In fact, feedback raises the need for new KITs and KIQs, either by identifying intelligence gaps or the need for entirely new CI projects. This gives continuance to the Intelligence Cycle, which is subsequently activated (Botha & Boon, 2008). Under this perspective, CI is not an ad-hoc but a continuous, systematic and structured process (Viviers et al., 2005).

Capabilities: The CI practitioner needs a considerable number of different skills and expertise throughout the process. This highlights the need for a collaborative approach in CI projects (Araujo et al., 2017). Most notably, rational and emotional skills are needed to be successful in developing relevant, actionable insights. These include understanding needs and defining KITs, collection from open and human sources, the reasoning for analysis, communication skills to disseminate properly, and a fair amount of leadership skills to successfully manage the full project. More a Critical Success Factor than a phase on its own, it is not sequential in relation to other phases but a condition to guarantee overall CI efficacy.

Structure and Processes: Appropriate policies and procedures are vital for CI. A CI formal structure is equally important so that the overall organisation can collaborate with and contribute so that further benefits can be withdrawn (Kahaner, 1996). A pivotal example of such policies is the Code of Ethics, which, allied to the applicable legal framework, must be part of CI operating policies (Pellissier & Nenzhelele, 2013a). Structure and Processes are also Critical Success Factors for good CI, thus, more than just a phase.

Organisational Culture: A 'sine qua non' condition for CI to thrive is the appropriate organisational awareness and culture. Without an environment that fosters healthy market competitiveness and the sharing of both information and intelligence, CI efforts are expected to fail (Viviers et al., 2005). Organisational Culture is a Key Success Factor and one of the hardest issues to affect CI (Hedin & Thieme, 2010).

In summary, the above explanation exposes the challenges throughout the CI process that must be addressed, namely identifying real CI needs, translating them into the right KITs, and producing accurate and timely actionable insights for the right stakeholders, as well as the creation of the environment, to support it all.

6.4. DESIGN THINKING MINDSET & GUIDING PRINCIPLES

Five common themes and corresponding DT guiding principles used in practice were identified by (Carlgren et al., 2016) and are succinctly detailed below:

#1 User Focus – Insight, Observation and Empathy: This is the starting point for any project: identifying stakeholder's needs (Liedtka, 2015) and keep updating them along the process by using formal and informal feedback, in order to create an end-product tailored to address needs. Insight is the core of DT and the result of the observation of real problems faced by end-users. DT relies on observation to identify problems but also on problem-solving ideas. The observation includes what is not done and what is not said by the process stakeholders. User focus is evidenced in the empathy (Micheli et al., 2019), thorough end-user understanding and engagement. Empathy is the core value of the human-centeredness (Liedtka, 2015), allowing to understand what is meaningful to the end users (Connell & Tenkasi, 2015) and develop better solutions for end user's articulated and non-articulated needs (Glen et al., 2014).

#2 Problem Framing – Non-linear Thinking, Openness, Comfortable with Ambiguity and Complexity: Instead of jumping to the solution, use analysis to deconstruct the problem, widening the challenge so it is possible to understand complex problems and enlarge the solutions areas. It then reframes the problem using synthesis to define the real problem. DT as the enabler of advancement through “The Knowledge Funnel” (Martin, 2010): starting by exploration of a mystery – a relevant question, followed by the development of a heuristic – a rule of thumb that helps focus the research efforts, to arrive to an algorithm – a fixed formula deriving from a generally applicable rule of thumb. In this context, a Heuristic is “an incomplete yet advanced understanding of what was previously a mystery”, while an Algorithm is an “explicit step-by-step procedure to solve a problem” (Martin, 2009b). Design thinking is thus proposed as an alternative approach to the typical linear problem-solving (Luchs et al., 2016; Martin, 2010), namely the ‘wicked’ one's (Buchanan, 1992). Since ambiguity is an underlying concept in defining and approaching wicked problems, design thinking's embracing of ambiguity and complexity through non-linear thinking can help frame and solve this type of problems (Micheli et al., 2019).

#3 Visualisation - Making the Complex Simple: Uses drawings and visual adds to understand a process or problem, as well as to communicate analysis, models, and complex findings. Improve communication efficiency by reaching wider and non-expert audiences. Storytelling – a means of visualisation – is used to put ideas in context and derive meaning from them (Micheli et al., 2019). The point of the story is understanding the story itself, in other words, getting to insight. Shibumi is one of the Zen principles of Design, an overarching concept, an ideal. The meaning is reserved for objects and experiences that exhibit in paradox, and all at

once, the very best of everything and nothing. In summary, making the complex look simple: elegant simplicity, effortless effectiveness, understated excellence, and beautiful imperfection (Susanka & Obolensky, 2009).

#4 Experimentation – Iteration, Prototyping, and Creativity: This relates to the concept of the unfinished. Identifying the heuristics that are good enough for findings to proceed saves immensely valuable time, allowing more time to devise the best plan forward. It uses divergent and convergent thinking to explore possibilities and hypotheses to be able to identify the best insights and solutions, even if not deemed plausible at the beginning. The nature of the design process is to be an ongoing iteration to achieve superior results through the insight (Liedtka, 2015; Luchs et al., 2016, p. 324)

#5 Diversity – Integrative thinking: Collectively build new creative alternatives to address identified problems in a continuous balanced act which results in abductive thinking. This mode of thinking integrates seemingly disparate and unconnected data points and pieces of information into new thinking, promoting an approach towards workable solutions which is ‘assertion-based’ rather than ‘evidence-based’ and especially useful to derive new insights (Michlewski, 2008). This sits squarely between analytical mastery and intuitive originality, a constant trade-off between exploration and exploitation, integrating different perspectives and backgrounds in the project (Martin, 2009a). Cross-functional, heterogenous teams are better suited to deal with complex problems (Glen et al., 2014; Luchs et al., 2016; Micheli et al., 2019).

6.4.1. Design Thinking Impact on the CI Model

Previous attempts to improve the Intelligence Cycle have focused on the identification of its flaws and their originating factors (K. Wheaton, 2012; Tropotei, 2018). According to the latter, the technical models have shown their limitations in practice, and the human factor is still the critical success factor. It is thus the first time, to the best of the author’s knowledge, that a solution is proposed in the form of a mindset to address the management of the CI process rather than just the CI process itself. This potentially significant contribution to the advancement of the current state of the art is detailed next. Although DT is largely associated with a process, it is, in fact, a human-centred approach to problem-solving with a “set of principles that can be applied to a wide set of problems”. The type of problems DT addresses, such as the development of new processes, services, interactions and ways of communicating and collaborating (Brown, 2009), are very similar to the CI model pitfalls (Fleisher & Bensoussan, 2015) identified in section 3. These pitfalls, such as problem definition, project planning, data-gathering error, tool- and -technique error, synthesis error, communication transmission or channel error, communication reception error, and unsystematic development, can thus be potentially solved through the application of the DT mindset to the CI model.

DT focuses on the intersection between 1) Consumer & Customer needs – desirability; 2) the Technology that enables addressing those needs – feasibility; and 3) the creation of real Business value – viability (Brown, 2009). This intersection is critical to guarantee the success

of the CI project right from the start, as it helps select the most relevant, feasible and viable projects while allowing for the priority management of the business's portfolio of Intelligence needs. Increased focus and relevancy are thus evident contributions of DT to CI. Using this intersection to filter which CI projects to invest in can save considerable time, effort, and money while improving the response times to firm intelligence needs, hence Firm Performance.

Three important considerations can be drawn from the DT literature and guidelines presented in the previous section: 1) a mindset can guide the cultural change needed for embedding it in the organisation; 2) an integrative thinking approach allows for a holistic view of any challenge faced by the CI practitioner; 3) shift from problem to project thinking – helps navigate and balance the constraints - needs, technology and viability - and carries the CI from concept to reality.

Overall, due to the experimentation orientation, DT can bring the CI deliverable closer to the concept of Strategic Flux introduced within the larger concept of CI in real-time by (Madureira, 2013, 2017; Madureira & Gonçalves, 2017; Gundersen, 2018).

Intelligence Needs and Determining KITs/KIQs: DT principles of user focus and framing the problem may help guarantee that the correct KITs and KIQs are identified, delimiting the scope of the project. Better questions will undoubtedly lead to at least easier answers, if not better. The dynamic and constant iteration along the CI project can maintain their relevancy and business currency. Creating empathy with end-user problems to uncover latent needs and help to articulate the full set of real needs can be the difference between complete success or the need to start all over again. Visualisation can furthermore facilitate the interaction between stakeholders, namely between CI producers and users, to effectively pinpoint and articulate CI needs. Understanding a problem through designing, modelling or mind mapping a complex analysis – prototyping – can help identify potential intelligence needs. Finally, the integration of different perspectives and backgrounds can be useful to identify further needs that the end-user is not considering simply by not being aware of those perspectives, as well as the cross-impact effects on other functions and business areas. In summary, developing a holistic approach to intelligence needs analysis and its proper articulation.

Planning and Direction: DT's sweet spot of desirability, feasibility and viability is pivotal in planning, steering and delivering a CI project. The definition of what is possible from the outset, but even more, to keep it flexible through iteration, can greatly improve the management of the CI project. Improved communication, resulting from empathy between CI producer and end-user, may also help to align the CI function with the organisation at large. This may help eliminate the well-known problem of the 'bypass' of central functions by end-users who serve themselves, ending one-sided, completely wrong or half-correct perspectives. On the flip coin, it ends the insulation of the CI practitioner, avoiding the frequent situation of delivering thoughtful intelligence when the decision is already made or towards a brief that is outdated. The mandatory inclusion of different perspectives helps align towards a better solution, namely integrating the consumer and customer perspectives

that were not so long ago in the scope of Consumer Research, Marketing and Sales functions. DT user focus may help to overcome the current limitation of CI, both internally and externally. All the above add to the increased overall relevancy and efficiency of the CI project.

Data & Information Collection: DT can impact this phase mainly on three levels. The first is through the integration of new sources due to the diversity of perspectives. The second is through the usage of empathy in HUMINT, namely by establishing a better rapport with the owner of the data or information to be elicited, understanding the underlying reasons for a specific target to liberate non-sensitive information that can finally unlock the needed insight. The third is on using iteration and heuristics to identify the point where to stop collection, allowing for a faster response time without losing the explanatory power of the data collected. Most of the time, due to time, budget concerns, or even missing data points or information, the optimal solution is impossible or impractical. And this is where the use of heuristic methods can speed up the process of finding a satisfactory solution for CI purposes. Iteration would guarantee that more detail with less explanatory power would only be considered if needed so. Reduction in complexity and faster response time would be the major benefits.

Data and Information Processing (Structure, Elimination & Storing): This phase could benefit largely from the visualisation techniques DT bring into the equation, making the seemingly complex disparate data points into a set of organised information. User focus could also be applied to the information system, which stores data and information, making the CI analyst's job easier and more efficient, as well as the access to intelligence stored in the system by the end-user. DT applied to this stage would mainly improve the overall usage of CI.

Information Analysis: DT can support the CI practitioner in understanding the depth of insight needed for the decision-maker to make a given decision. Empathy could be used to run the CI operation more efficiently and produce the appropriate intelligence, namely the foresight that causes management to act. Together with heuristics which can be used to develop rules of thumb, educated guesses, intuitive judgments, stereotyping, profiling, or plain common sense can improve analysis in speed and simplicity. Abductive thinking is a logical way of considering such inferences or "best guess" leaps. And unlike deduction or induction, abductive logic would allow for the creation of new knowledge and insight, so adding value. Simultaneously, visual thinking can be used to get insight quicker, improving speed and depth. Similarly, experimentation, as (Brown, 2009) masterly explains, would allow for "...understanding does not entail progress toward an absolute truth, but rather an evolving interaction with the context or environment...". As an iterative and abductive reasoning approach, DT can be the enabler for the move from a finished style of deliverable to a more flux delivery. The delivery of layered intelligence can improve both understandings and lead to quicker decision-making. This results in more value realised earlier, with incremental value derived from a deeper understanding of the topic over time. Diversity could support the integration of different information sources and topics, leading to more solid insights and fewer blind spots.

Dissemination: CI end-users need to understand what happened, what is happening, and what may happen thoroughly. DT can help explain the insights in a simpler, although not simplistic, way. This would avoid excess detail and increase the probability of more effective communication using the Shibumi and visualisation principles. An important contribution would be matching the CI deliverable to user needs and preferences, which is not always the case, through increased user focus.

Usage and Decision Making: The improvement in communication due to iteration and integration of perspectives along the CI process would allow for a decrease in the inherent anxiety of the decision-maker and in the decision-making process, thus fostering the usage of the intelligence produced. That is what good intelligence should be: making the complex simple for the decision-maker. The concept of unfinished could also help decision-makers act on heuristics rather than wait for 100% correct insights that will be outdated when ready. DT can, though, help CI practitioners and end-users to act faster.

Feedback: User focus and experimentation can play a pivotal part in obtaining feedback, while integrative thinking can support the embedding of this feedback on the CI model. Both contribute to increased efficiency in all phases.

Capabilities: DT brings a considerable toolbox for the CI professional; most importantly, it can build a common mindset that builds on these tools to develop a unified culture that allows for the CI capability to flourish in an organisation.

Structure and Processes: DT diversity impacts organisational structure on the modus operandi more than on the structure itself. Integrating diverse perspectives demands a matrix approach rather than a hierarchical one. DT can provide the facilitating factor to improve the efficiency of this matrix approach. Processes-wise, DT's own process of Empathy, Defining, ideating, Prototype, is a great addition to the CI toolbox and can materialise the DT mindset across the organisation, in the CI process and in each phase. The potential impacts have been described above in this section.

Organisational Culture: DT can play a critical role in embedding the CI culture within the organisation by promoting team effort, knowledge sharing, curiosity, strategic flexibility, and mastering intelligence co-creation. DT, as a human-centred problem-solving approach, is a logical enabler for Customer Centricity, namely through the User Focus mindset.

The following figure summarises the last sections by juxtaposition the Intelligence Cycle phases description and related pitfalls, the applicable DT mindset and guiding principles, the potential contributions and two illustrative practical examples (Figure 6.2).

INTELLIGENCE CYCLE	PHASE DESCRIPTION	APPLICABLE DT MINDSET & GUIDING PRINCIPLES (Carlgren, et al, 2016)	POTENTIAL CONTRIBUTIONS	2 ILLUSTRATIVE PRACTICAL EXAMPLES
	PITFALLS			
NEEDS	• Determine must-have actionable insights for decision-making	#1 User Focus – Insight, Observation & Empathy #2 Problem Framing – Non-linear Thinking, Openness, Comfortable with Ambiguity and Complexity #3 Visualisation - Making the Complex Simple #5 Diversity – Integrative thinking	- Identify real end-user needs - Better problem framing and CI Project scope definition - Iterative feedback / communication - Holistic approach to intelligence needs analysis and its proper articulation - Empathy to help remove bias in CI capabilities assessment	- Use empathy to better understand needs leading to better KIQs and more relevant insights - Use a cross functional approach and team in defining KIQs and KIQs
	• Poor problem definition Correct identification of Intelligence Needs Biased evaluation of CI capabilities Needs are static over time Bad communication between end-user and Intelligence producer			
PLANNING & DIRECTION	• Resource allocation and CI project direction	#1 User Focus – insight, Observation & Empathy #3 Visualisation - Making the Complex Simple #4 Experimentation – Iteration, Prototyping, and Creativity #5 Diversity – Integrative thinking	- User focused planning - Integrate logic and emotion - Flexibility and Agility in Project management through iteration - Integrate different perspectives to improve CI efficacy and efficiency	Plan the CI project with the end-user needs in mind rather than the completion of the Project itself or the technical constraints
	• Unfocused, unstructured, illogical, ad-hoc, rigid project planning			
COLLECTION	• Identification of sources, its research, and the ethical and legal gathering of relevant data and information using a considerable number of techniques	#1 User Focus – Insight, Observation and Empathy #4 Experimentation – Iteration, Prototyping, and Creativity #5 Diversity – Integrative thinking	- Diversity foster the consideration and integration of new sources - Empathy to facilitate HUMINT - Creativity in the identification of sources from difficult to obtain data	- Use empathy to obtain rapport with Human Sources - Explore new sources such as Social Web Listening for Consumer Needs identification
	• Internal information silos Source-, Tool-, and Technique-error Data-gathering error Pervasiveness of collection capabilities, mindset, legal and ethical standards compliance			
PROCESSING	• Organise, systematise, store and maintain database	#1 User Focus – Insight, Observation & Empathy #3 Visualisation - Making the Complex Simple	- User-centred Information System development facilitating adoption - Visualization as a tool identify relevant data and filter noise	- User friendly Information System's interface development for both CI practitioners and decision-makers - Use Mind Mapping techniques and tools to structure collected data
	• CI System design: Simplicity, accessibility, security, capture internal information production, retrievability, account for end-user perspective			
ANALYSIS	• Collaborative analysis and interpretation of data and information for patterns, meaning and potential impact on the organization	#1 User Focus – Insight, Observation and Empathy #2 Problem Framing – Non-linear Thinking, Openness, Comfortable with Ambiguity and Complexity #3 Visualisation - Making the Complex Simple #4 Experimentation – Iteration, Prototyping, and Creativity #5 Diversity – Integrative thinking	- Better understanding of end-user needs support choice of best analysis tool improving outcome's timeliness and simplicity - New insights by making sense of seemingly disparate data points either using Integrative Thinking approach and Visualization techniques - Visual Thinking impact on speed to insight and new insights - Heuristic approach enables insights Flux, and potentially quicker and higher added value decision-making - Integrative Thinking potential dismisses more blind spots	- Visualisation through Social Graphs to identify understand communication audiences - Intermediate cross check with internal experts on the development of the CI deliverable to account to avoid blind spots only identifiable by subject matter experts
	• Analyst single perspectiveness Synthesis error Analysis bias Tool-, Technique, and Application-error Loose sight of end-goal Production of non-actionable outcome			
DISSEMINATION & STORAGE	• Guarantee effective communication of the right actionable insights, at the right time, to the right decision-maker, in the right format, through a secure means. Storage for future use in CI development..	#1 User Focus – Insight, Observation and Empathy #3 Visualisation - Making the Complex Simple	- Understanding end-user needs and simpler ways of presenting insights, in the best format from the user's perspective can improve communication significantly. - Reduce anxiety through better communication	- Read end-users body language in reaction to CI deliverables to improve the later - Focus on user decision timings rather than when CI deliverable is ready for dissemination
	• Communication transmission-, channel- or means-error Communication reception error Outdated Wrong time Confidentiality Noise			
USAGE & DECISION-MAKING	• Acting upon insights	#1 User Focus – Insight, Observation and Empathy #4 Experimentation – Iteration, Prototyping, and Creativity	- Simplify the decision through better and tailored intelligence - Faster decision making allowing for timely opportunity exploitation	- Identify end-user usage of intelligence to decide on the best format for the CI deliverable - Provision flux of insights to support decision-making instead of a full extensive report hard to assimilate
	• Lack of applicability, currency, interactivity, timeliness			
FEEDBACK	• Obtain and integrate feedback to increase efficiency	#1 User Focus – Insight, Observation & Empathy #4 Experimentation – Iteration, Prototyping, and Creativity #5 Diversity – Integrative thinking	Integrate and embed feedback from the continuous iterations with the multitude of stakeholders improving efficiency throughout the CI process	- Implement evaluation system for CI deliverables - Integrate feedback as available in the CI project charter
	• Miscommunication Lack of feedback Break the Cycle			
CAPABILITIES	• Range of skills and expertise needed by the CI practitioner	#1 User Focus – Insight, Observation and Empathy #2 Problem Framing – Non-linear Thinking, Openness, Comfortable with Ambiguity and Complexity #3 Visualisation - Making the Complex Simple #4 Experimentation – Iteration, Prototyping, and Creativity #5 Diversity – Integrative thinking	- Enable Consumer and User Centricity, namely in identifying and respond to end-user needs - Enable Change Management, namely in Intelligence Culture development - Enable collaborative decision-making - A considerable new toolset that is applicable to every phase (e.g. Problem Framing, Visualisation, etc) enabling development of new capabilities in CI and across the organization	- Use DT Mindset and Guiding Principles in Consumer Intelligence Projects - Implement User Focus as a must have consideration as the starting point for every CI project
	• Needs misidentification No agency Wrong or partial insights			
STRUCTURE & PROCESS	• Functional formal structure, policies and procedures	#4 Experimentation – Iteration, Prototyping, and Creativity #5 Diversity – Integrative thinking	- Experimentation as an enabler for increase process efficiency - Diversity as an enabler for Matrix structures	- Experiment with existing processes for efficiency improvement - Flexible CI team structure by CI project
	• Potential illegal or unethical conduct			
ORGANIZATIONAL CULTURE	• Functional awareness and supporting culture	#1 User Focus – Insight, Observation and Empathy #2 Problem Framing – Non-linear Thinking, Openness, Comfortable with Ambiguity and Complexity #3 Visualisation - Making the Complex Simple #4 Experimentation – Iteration, Prototyping, and Creativity #5 Diversity – Integrative thinking	- Enable the embedment of a CI culture - Enable collaborative CI production	- Use Empathy to guarantee any decision start with consumer enabling Customer Centricity culture development - Use cross-functional projects teams for CI co-creation
	• Functional unsuccess			
COMMON TO ALL PHASES	• Process Management	#2 Problem Framing – Non-linear Thinking, Openness, Comfortable with Ambiguity and Complexity #4 Experimentation – Iteration, Prototyping, and Creativity	- Increased focus and relevancy - Increase Timeliness and enables the Strategic Flux - Improves Firm Performance - A Cultural transformation enabler that can support the CI culture development, hence overall efficiency and adoption - Holistic view of any CI Project - Project Thinking - Iteration and Heuristics to improve changing phase decision	- Efficient selection of CI projects - Priority management of CI needs - Development of new CI processes, services, interactions and ways of communicating and collaborating
	• Unsystematic development When to change phase Thoroughness/Timeliness trade-off			

Figure 6.2 – Intelligence Cycle phases description and respective pitfalls, Carlgren's DT mindset and guiding principles, potential contribution to solve identified pitfalls, and two illustrative practical examples

6.5. CONCLUSION

The development of a DT mindset by CI practitioners would support the advancement of the function to cope with the current and the competitive environment of the future. Most

importantly, it can address current CI issues such as the breadth and articulation of end-user needs, the sequential cycle nature of the process, which slows down response time, coping with an exponential speed of change in the competitive environment, and embedding CI, and its culture of informed decision-making, within the organisation at large.

Empathy supports the superior alignment with the internal client while at the same time can improve both Primary and Secondary information collection, balancing the most rational and highly logical approach CI practitioners tend to apply today. Very importantly, it forces CI to focus on the customer, as well as the organisation which uses the insights derived from such a mindset. It thus promotes the change from an internal to an external focus, leading to the customer-centric organisation, a prerequisite for success as 'quality,' price, and operational efficiency are fewer and fewer factors of differentiation.

The Design Thinker CI practitioner, one who masters heuristic development, can deliver rules of thumb for much faster decision-making than the current model focused on providing 100% right actionable insights. If we consider that societal and technological changes occur at a blindingly faster pace, DT may be a valid way to help CI practitioners and organisations to keep up. The use of iteration and heuristics can shorten response time while increasing the efficiency of the overall process and the accuracy of deliverables. This results from an increased capacity to deal with complexity via improved sense-making and non-linear thinking through the usage of abductive reasoning.

Visualisation and design principles like Shibumi would also upgrade the CI practitioner's capability to communicate findings more effectively without falling for simplistic approaches to complex problems. This can support CI's superior usage and inherently superior Firm Performance.

From the above, DT seems to be able to support the reduction of the response time to the intelligence challenges of today, and most notably from tomorrow.

6.6. LIMITATIONS AND RECOMMENDATION

This paper is a starting point for the improvement of the CI model effectiveness and, subsequently, Firm Performance. To keep this research within scope, the analysis was constrained to the improvement of the CI model. Hence potential drawbacks resulting from the application of the DT mindset are a clear limitation. This should be considered in future research, as well as the validity of the application of DT principles to CI, building upon the application ideas with more consubstantiated recommendations. Additional focus can be given to measuring the impact of the proposed CI model on Firm Performance and comparison with alternative proposed CI model improvements.

7. RESULTS AND DISCUSSION

7.1. SUMMARY OF MAIN FINDINGS

This study provides a unified view, a modular definition, and the identification, naming, and confirmation of the five core defining dimensions of CI. These dimensions, the 5Ps, are the Purpose, Purview, Practices, Process, and Product of CI. A set of key aspects and respective descriptors are identified for each dimension. The result is the CI model delimitation and visualisation, which enables a general definition of CI and granular definitions for related concepts (e.g., market intelligence, business intelligence, or artificial intelligence). An underlying ontology was developed to support the development of the CI model. The model, construct, and definition were empirically validated by top CI global subject matter experts, providing for a sound scientific definition grounded in practice. The study confirms the reliability, and the content, external and discriminant validities, filling a foundational gap in the history of the CI discipline. Furthermore, a unified CI maturity model and a set of instruments are proposed to implement, measure and guide the development of the CI practice. A unified maturity model addresses the shortcomings of previous models guaranteeing a thorough and accurate measurement of CI. A set of implementation frameworks guide CI implementation across the five dimensions. Finally, this study suggests the design thinking mindset, giving examples of potential improvements, as the ideal mental model for practitioners, professionals and researchers to take CI to the next level in advancing organisational performance.

7.2. DISCUSSION

Colquitt & Zapata-Phelan (2007), the study qualifies as an expander given the relatively high theory-building and theory-testing contributions. Overall, the result is the general theory of CI addressing the study's aims of laying down the foundations of CI science and expanding its praxis – art, science and practice.

The first-ever empirical validation of the CI unified view and modular definition fills a century-long literature gap. The common language, general CI definition, and more granular definitions of related concepts should create consensus and significantly reduce polysemy and synonymy. Therefore, it should propel the discipline from CI as a practice, process, and product to CI as a science.

The identification of CI dimensions (5Ps), aspects, and descriptors supported the definition and visualisation of the CI model to guide the implementation of functions and programs in organisations. Increased practice will allow further and more relevant empirical contributions.

The content, reliability, external, and discriminant validities mean that CI becomes a scientific practice. A CI scientific practice will improve the sustained performance of organisations contributing to economic development and the betterment of society.

The immediate consequence is the delimitation of the BoK, allowing for the ignition of the CI virtuous cycle (Figure 1.1). The impact is threefold. Firstly, the definition of the professional scope with the consequent effectuation of the profession. Secondly, the curricula development for CI education. Thirdly, the clarification of the scientific structure for research. Overall, it catapults CI research, practice and education into the future. As such, it addresses the red queen challenge identified by Prescott (2014), closing the existing educational gap and promoting CI admittance in academia. In parallel, it allows for further developments of specific frameworks, tools and techniques which differentiate CI from the related disciplines. Both will drive mobilisation towards CI development.

The UCIMM proposed allows for the thorough and accurate measurement of the CI implementation level, allowing for the assessment of its current maturity stage and developing a strategy for its improvement. In order to guide the CI practice improvement, the implementation frameworks and mindset offered will prove instrumental. The number of CI functions and programs should increase significantly, given the contributions of this study and the current business background (cf. section 1.1).

7.3.CONTRIBUTIONS

The study impacts management scholarship in several areas (Wickert et al., 2020). Scholarly, the findings go beyond the previous attempt to develop a general theory of CI (Marcial, 2018) by identifying the scientific object of study, research problems, research and applied methods, and documenting the key evolution milestones. Furthermore, they allow for validating the previously proposed scientific structure and research system (Marcial, 2018). Thus, it enables the professionalisation, generalizability, and identification of the current research paradigm of CI. Practical impact derives from developing a scientifically validated construct, frameworks and measures to guide practitioners in implementation, the underlying principles, and contextual significance across the full spectrum of CI stakeholders. Societal impact is achieved from the betterment of society through economic growth resulting from the improved performance of organisations, both from the top line and more efficient use of resources. Policy impact results from applying CI to the national/international sphere, supporting the efficient development of policies within the advocacy, control, and ethics (ACE) framework. Finally, the educational impact is guaranteed by providing the base for scientific curricula to be developed and taught in education.

8. LIMITATIONS & FUTURE RESEARCH AGENDA

All studies come with their idiosyncrasies and limitations. The empirical CI construct validation is limited to 20 top subject matter experts, which, although trailblazing, may impact the quality of the empirical evidence. The fundamental limitations are thus the number of in-depth interviews, below the significant sample threshold of 30, covering a potentially incomplete or skewed geographical scope, and no triangulation of the results. As such, a study aimed at elevating the accuracy of the empirical validation of the CI construct has been submitted to a top-grade journal based on 61 in-depth interviews with global geographical and triangulation of results. Similarly, the UCIMM study was limited to the CIMMs. Hence, further exploration of maturity models of related disciplines (e.g., BI, AI or Data Science) could identify additional key success factors or aspects that must be addressed to implement CI successfully. Overall, the expected theoretical contributions surpassed the initial expectations, but the true impact of these ground-breaking findings on CI science can only be assessed with a future longitudinal study.

The future roadmap for research is considerably vast. An improvement to the CIMM is the development of a validated scale to research the theoretical and empirical development of CI. This need was verified in the feedback from the subject matter expert's interviews. The implicit CI ontology would benefit from a published version to further reduce polysemy, synonymy and misunderstanding on the hierarchy or related fields within CI. Given the latest advances in technology, namely AI, Competitive Augmented Intelligence is an attractive topic as the integration of AI machine and natural human intelligence. Given the TAR – timely, actionable, accurate, and relevant – criteria for good CI, and the exponential pace of change, a real-time capability should also be considered in future research.

9. CONCLUSION

A scientific definition of the CI construct (Madureira et al., 2021a), empirically validated (Madureira et al., 2021b), with instruments to measure and implement it (Madureira et al., 2023), and a guiding mindset (Madureira, 2019), were offered. The foundations for CI science were set to support the effectuation and development of the praxis (art, practice, and science) at the individual/professional, organisational/function and country/policy levels. The conditions are in place to ignite the CI virtuous cycle to propel CI professionalisation, education, and research, into a new era. The resulting scientific practice of CI should enable the sustained performance of organisations in times of unprecedented change. Therefore, this study supports the CI manifesto of “We are CI professionals”, “We do CI science”, and “CI shapes the future of business.”

10. REFERENCES

- Aaker, D. A., Kumar, V., Leone, R. P., & Day, G. S. (2013). *Marketing Research: International Student Version*. John Wiley & Sons New York, NY.
- ACI, & Gilad, B. (2022). 2022 CIPTM Survey—A Changing Role Bodes Well (p. 16) [Survey]. Academy of Competitive Intelligence.
- Ackoff, R. L. (1999). *Ackoff's Best: His Classic Writings on Management* (1st ed.). Wiley.
- Adamala, S., & Cidrin, L. (2011). Key Success Factors in Business Intelligence. *Journal of Intelligence Studies in Business*, 1(1), 107–127. <https://doi.org/10.37380/jisib.v1i1.19>
- Adidam, P. T., Banerjee, M., & Shukla, P. (2012). Competitive Intelligence and Firm's Performance in Emerging Markets: An Exploratory Study in India. *Journal of Business & Industrial Marketing*, 27(3), 242–254. <https://doi.org/10.1108/08858621211207252>
- Afolabi, B., & Thiery, O. (2005). Système d'intelligence économique et paramètres sur l'utilisateur: Application à un entrepôt de publications. *Informations, Savoirs, Décisions et Médiations [Informations, Sciences for Decisions Making]*, 22.
- Aguilar, F. J. (1967). *Scanning the business environment* (1st THUS). Macmillan.
- Albaum, G. (1962). *A New Approach to the Information Function in Marketing* [PhD Dissertation]. The University of Wisconsin - Madison.
- Albaum, G. (1964). Horizontal Information Flow: An Exploratory Study. *Academy of Management Journal*, 7(1), 21–33. <https://doi.org/10.5465/255231>
- Albaum, G. (1967). Information Flow and Decentralized Decision Making in Marketing. *California Management Review*, 9(4), 59–70. <https://doi.org/10.2307/41164077>
- Alden, B. H., & Campbell, B. C. (1959). *Competitive Intelligence: Information, Espionage, and Decision-Making. A Special Report for Businessmen* (Harvard University-Prepared by Students at the Graduate School of Business Administration). C.I. Associates.
- Alderson, W. (1937). A Marketing View of Competition. *Journal of Marketing*, 1(3), 189–190. <https://doi.org/10.1177/002224293700100302>
- Alshammakh, A. M., & Azmin, A. A. (2021). The Relationship Between Competitive Intelligence Processes and Hotels' Performance: Evidence from Malaysia. *Journal of Tourism, Hospitality and Environment Management*, 6(26), 27–46. <https://doi.org/10.35631/JTHEM.626002>
- Alvares, L. M. A. de R., Itaborahy, A. L. C., & Machado, R. P. M. (2020). Modelo de Maturidade em Inteligência Organizacional: Uma visão integrada à gestão da informação, gestão do conhecimento e inteligência competitiva. *Informação & Sociedade: Estudos*, 30(4), 1–21. <https://doi.org/10.22478/ufpb.1809-4783.2020v30n4.57352>
- Aly, S. (2022). The Effect of Marketing Intelligence Adoption on Enhancing Profitability Indicators of Banks Listed in the Egyptian Stock Exchange. *Journal of Intelligence Studies in Business*, 12(3), 38–53. <https://doi.org/10.37380/jisib.v12i3.906>
- Andresen, M., & Bergdolt, F. (2017). A systematic literature review on the definitions of global mindset and cultural intelligence—merging two different research streams. *International Journal of Human Resource Management*, 28(1), 170–195. <https://doi.org/10.1080/09585192.2016.1243568>

- APQC, Hasanali, F., Leavitt, P., & Lemons, D. (2004). *Competitive Intelligence: A Guide for Your Journey to Best-Practice Processes*. Amer Productivity Center.
- Araujo, H., Costa, C. J., & Aparicio, M. (2017). Modelo De Competitive Intelligence (CI) / Competitive Intelligence (CI) Model. *12th Iberian Conference on Information Systems and Technologies*, 1–6. <https://doi.org/10.23919/CISTI.2017.7975787>
- Argyris, C. (1977). Organizational Learning and Management Information Systems. *Accounting, Organizations and Society*, 2(2), 113–123. Elsevier. [https://doi.org/10.1016/0361-3682\(77\)90028-9](https://doi.org/10.1016/0361-3682(77)90028-9)
- Babbar, S., & Rai, A. (1993). Competitive Intelligence for International Business. *Long Range Planning*, 26(3), 103–113. [https://doi.org/10.1016/0024-6301\(93\)90012-5](https://doi.org/10.1016/0024-6301(93)90012-5)
- Badr, A., Wright, S., & Pickton, D. W. (2004). *Competitive Intelligence and the Formulation of Marketing Strategy* (Research ISBN: 1857213661; Competitive Intelligence, p. 17). Marketing Interface Teaching & Research Initiative (CIMITRI); dora.dmu.ac.uk.
- Barnea, A. (2020). Strategic Intelligence: A Concentrated and Diffused Intelligence Model. *Intelligence and National Security*, 35(5), 701–716. <https://doi.org/10.1080/02684527.2020.1747004>
- Barnett, W. P. (2016). The Red Queen Among Organizations: How Competitiveness Evolves. In *The Red Queen among Organizations* (1st ed., p. 272). Princeton University Press.
- Bartes, F. (2014). Defining a basis for the new concept of competitive intelligence. *Acta Universitatis Agriculturae Et Silviculturae Mendelianae Brunensis*, 62(6), 1233–1242. <https://doi.org/10.11118/actaun201462061233>
- Baumard, P. (1991). *Stratégie et surveillance des environnements concurrentiels* (1st ed.). Masson.
- Bechara, J. P., & Van de Ven, A. H. (2007). Philosophy of science underlying engaged scholarship. In *Engaged scholarship: A guide for organizational and social research* (pp. 1–39). Oxford University Press.
- Ben Sassi, D., Frini, A., Chaieb, M., & Ben Abdesslem Karaa, W. (2022). A Rough Set-Based Competitive Intelligence Approach for Anticipating Competitor's Action. *Expert Systems with Applications*, 117523. <https://doi.org/10.1016/j.eswa.2022.117523>
- Ben Sassi, D., Frini, A., Karaa, W. B. A., & Kraiem, N. (2015). Multi-Criteria Decision Aid and Artificial Intelligence for Competitive Intelligence. *Lecture Notes in Computer Science*, 9101, 171–178. https://doi.org/10.1007/978-3-319-19066-2_17
- Bennett, N., & Lemoine, J. (2014). What a difference a word makes: Understanding threats to performance in a VUCA world. *Business Horizons*, 57(3), 311–317. <https://doi.org/10.1016/j.bushor.2014.01.001>
- Bensoussan, B. E., & Fleisher, C. S. (2007). Business and competitive analysis: Effective application of new and classic methods. *New Jersey: Financial Times Prentice Hall*.
- Berkowitz, B. D., & Goodman, A. E. (1989). *Strategic Intelligence for American National Security* (1st ed.). Princeton University Press.
- Berthold, M. R., Borgelt, C., Höppner, F., Klawonn, F., & Silipo, R. (2020). *Guide to Intelligent Data Science: How to Intelligently Make Use of Real Data* (2nd ed.). Springer International Publishing. <https://doi.org/10.1007/978-3-030-45574-3>

- Berthold, M. R., Cebron, N., Dill, F., Gabriel, T. R., Kötter, T., Meinl, T., Ohl, P., Sieb, C., Thiel, K., & Wiswedel, B. (2008). KNIME: The Konstanz Information Miner. In C. Preisach, H. Burkhardt, L. Schmidt-Thieme, & R. Decker (Eds.), *Data Analysis, Machine Learning and Applications* (pp. 319–326). Springer. https://doi.org/10.1007/978-3-540-78246-9_38
- Biesta, G. (2010). Pragmatism and the Philosophical Foundations of Mixed Methods Research1. In A. Tashakkori & C. Teddlie, *SAGE Handbook of Mixed Methods in Social & Behavioral Research* (2nd ed., pp. 95–118). SAGE Publications, Inc. <https://doi.org/10.4135/9781506335193.n4>
- Blei, D. M. (2012). Probabilistic Topic Models. *Communications of the ACM*, 55(4), 77–84. <https://doi.org/10.1145/2133806.2133826>
- Blei, D. M., Ng, A. Y., & Jordan, M. I. (2003). Latent Dirichlet allocation. *Journal of Machine Learning Research*, 3(4/5), 993–1022. <https://doi.org/10.1162/jmlr.2003.3.4-5.993>
- Blenkhorn, D. L., & Fleisher, C. S. (2013). Matching Intelligence Teaching Methods with Different Learners' Needs. *Journal of Strategic Security*, 6(3), 61–72. USF Libraries at Scholar Commons. <https://doi.org/10.5038/1944-0472.6.3.6>
- Bollen, K. (2015). *Reproducibility, replicability, and generalization in the social, behavioral, and economic sciences* [Academic]. SBE AC Spring Meeting, National Science Foundation. https://www.nsf.gov/sbe/SBE_Spring_2015_AC_Meeting_Presentations/Bollen_Report_on_Replicability_SubcommitteeMay_2015.pdf
- Borko, H. (1968). Information science: What is it? *American Documentation*, 19(1), 3–5. <https://doi.org/10.1002/asi.5090190103>
- Bose, R. (2008). Competitive Intelligence Process and Tools for Intelligence Analysis. *Industrial Management & Data Systems*, 108(4), 510–528. <https://doi.org/10.1108/02635570810868362>
- Bostrom, N. (2014). *Superintelligence: Paths, Dangers, Strategies* (1st ed.). Oxford University Press.
- Botha, D. F., & Boon, J. A. (2008). Competitive intelligence in support of strategic training and learning. *South African Journal of Information Management*, 10(3), 11. <https://doi.org/10.4102/sajim.v10i3.325>
- Breakspear, A. (2013). A new definition of intelligence. *Intelligence and National Security*, 28(5), 678–693. <https://doi.org/10.1080/02684527.2012.699285>
- Brocke, J., Simons, A., Niehaves, B., Niehaves, B., Reimer, K., Plattfaut, R., & Cleven, A. (2009). Reconstructing the Giant: On the Importance of Rigour in Documenting the Literature Search Process. *ECIS 2009 Proceedings*, 161. <https://aisel.aisnet.org/ecis2009/161/>
- Brody, R. (2008). Issues in defining competitive intelligence: An exploration. *IEEE Engineering Management Review*, 36(3), 3–16. IEEE. <https://doi.org/10.1109/emr.2008.4648884>
- Brown, T. (2009). *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation*. Harper Collins.
- Bruin, T. de, Freeze, R., Kulkarni, U., & Rosemann, M. (2005). Understanding the Main Phases of Developing a Maturity Assessment Model. *ACIS 2005 Proceedings*, 109. <https://aisel.aisnet.org/acis2005/109>
- Brummer, H. L. (2005). *A Dynamic Competitive Analysis Model for Global Mining Firms* [PhD Commerce - Business Management]. University of South Africa.

- Buchanan, R. (1992). Wicked Problems in Design Thinking. *Design Issues*, 8(2), 5–21.
<https://www.jstor.org/stable/1511637>
- Bulger, N. J. (2016). The evolving role of intelligence: Migrating from traditional competitive intelligence to integrated intelligence. *The International Journal of Intelligence, Security, and Public Affairs*, 18(1), 57–84. <https://doi.org/10.1080/23800992.2016.1150691>
- Calof, J. (1998). Increasing your CIQ: The competitive intelligence edge. *Economic and Technology Development Journal of Canada*, Art 22/98, 103–108.
- Calof, J., Richards, G., & Santilli, P. (2017). Insight Through Open Intelligence. *Journal of Intelligence Studies in Business*, 7(3).
- Calof, J., Richards, G., & Smith, J. (2015). Foresight, Competitive Intelligence and Business Analytics—Tools for Making Industrial Programmes More Efficient. *Foresight-Russia*, 9(1), 68–81. <https://doi.org/10.17323/1995-459X.2015.1.68.81>
- Calof, J., Santilli, P., & Richards, G. (2017). Insight Through Open Intelligence. *Competitive Intelligence Magazine*, 20(3), 6–20.
- Calof, J., Sewdass, N., & Arcos, R. (2017). Competitive Intelligence: A 10-year Global Development. *Competitive Intelligence Magazine*, 20(2), 21–26.
- Calof, J., & Skinner, W. (1998). Competitive Intelligence for Managers: A Brave New World. *Optimum, The Journal of Public Sector Management*, 28(2), 38–43. www.optimumonline.ca
- Capuano, E. A., Casaes, J., Costa, J. R. da, Jesus, M. S. de, & Machado, M. A. (2009). Inteligência Competitiva e suas Conexões Epistemológicas com Gestão da Informação e do Conhecimento. *Ciência da Informação*, 38(2), 19–34. <https://doi.org/10.1590/S0100-19652009000200002>
- Carlgren, L., Rauth, I., & Elmquist, M. (2016). Framing design thinking: The concept in idea and enactment. *Creativity and Innovation Management*, 25(1), 38–57.
<https://doi.org/10.1111/caim.12153>
- Cavalcanti, E. P. (2005). The Relationship Between Business Intelligence and Business Success. *Journal of Competitive Intelligence and Management*, 3(1), 6–15.
- Cavaller, V. (2014). Analysis of Knowledge Transference Processes in First Mission Activities of Universities: Portfolios as Proposal of Analytical Tool for Competitive Intelligence Functions. *Journal of Intelligence Studies in Business*, 4(1), 16–25. <https://doi.org/10.37380/jisib.v4i1.83>
- Cavallo, A., Sanasi, S., Ghezzi, A., & Rangone, A. (2020). Competitive Intelligence and Strategy Formulation: Connecting the Dots | Emerald Insight. *Competitiveness Review*, 31(2), 250–275. <https://doi.org/10.1108/CR-01-2020-0009>
- CBInsights. (2019, July 17). Personally Disrupted: 14 CEOs Who Got Axed After Failing to Navigate Disruption [Commercial]. *CB Insights Research*. <https://www.cbinsights.com/research/ceo-disruption/>
- Cekuls, A. (2022). Expand the scope of competitive intelligence. *Journal of Intelligence Studies in Business*, 12(1), 4–5. <https://doi.org/10.37380/jisib.v12i1.924>
- Central Intelligence Agency. (2008). *What is Intelligence?* [Institutional]. CIA.Gov.
<https://www.cia.gov/news-information/featured-story-archive/2007-featured-story-archive/what-is-intelligence.html>

- Cervantes, B. M. N. (2004). *Contribuição Para a Terminologia Do Processo De Inteligência Competitiva: Estudo Teórico E Metodológico* [MSc Information Science]. Universidade Estadual Paulista Júlio de Mesquita Filho.
- ChallengerGray. (2020). *2019 Year-End CEO Report: 160 CEOs Out in December, Highest Annual, Quarterly Totals on Record* [Survey]. Challenger, Gray & Christmas, Inc. <http://www.challengergray.com/press/press-releases/2019-year-end-ceo-report-160-ceos-out-december-highest-annual-quarterly-totals>
- Christian, B., & Griffiths, T. (2016). *Algorithms to Live by: The Computer Science of Human Decisions* (First U.S. Edition). Henry Holt and Company.
- CI Fellows. (2023). *Education* [Community Portal]. CI Fellows. <https://www.cifellows.com/resources/education/>
- Cipher. (2020). *Market and Competitive Intelligence Defined and Explained* [Commercial]. Cipher. <https://www.cipher-sys.com/competitive-intelligence>
- Cleland, D. I., & King, W. R. (1975). Competitive Business Intelligence Systems. *Business Horizons*, 18(6), 19–28. [https://doi.org/10.1016/0007-6813\(75\)90036-1](https://doi.org/10.1016/0007-6813(75)90036-1)
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35(1), 128–152. <https://doi.org/10.2307/2393553>
- Colquitt, J. A., & Zapata-Phelan, C. P. (2007). Trends in theory building and theory testing: A five-decade study of the academy of management journal. *Academy of Management Journal*, 50(6), 1281–1303. <https://doi.org/10.5465/AMJ.2007.28165855>
- Comai, A. (2004). Global Code of Ethics and Competitive Intelligence Purposes: An Ethical Perspective on Competitors. *Journal of Competitive Intelligence and Management*, 2(1), 25–44.
- Comai, A., & Prescott, J. E. (2007). *Workbook: World-Class Competitive Intelligence Function* (E. Ediciones, Ed.; 1st ed.). Emecom Ediciones.
- Connell, S. E. F., & Tenkasi, R. V. (2015). Operational Practices and Archetypes of Design Thinking. *Research in Organizational Change and Development*, 23, 195–252. <https://doi.org/10.1108/S0897-301620150000023005>
- Conner, K. R. (1991). A historical comparison of resource-based theory and five schools of thought within industrial organization economics: Do we have a new theory of the firm? *Journal of Management*, 17(1), 121–154. <https://doi.org/10.1177/014920639101700109>
- Cooper, H. M. (1988). Organising Knowledge Syntheses: A Taxonomy of Literature Reviews. *Knowledge in Society*, 1(1), 104–126. <https://doi.org/10.1007/BF03177550>
- Cox, D. F., & Good, R. E. (1967). How to Build a Marketing Information System. *Harvard Business Review*, 45(3), 145–154.
- Crayon, & SCIP. (2022). *2022 State of Competitive Intelligence* (State of Competitive Intelligence, p. 44) [Survey]. Crayon.
- Creswell, J. W. (2010). Mapping the Developing Landscape of Mixed Methods Research. In A. Tashakkori & C. Teddlie, *SAGE Handbook of Mixed Methods in Social & Behavioral Research* (2nd ed., pp. 45–68). SAGE Publications, Inc. <https://doi.org/10.4135/9781506335193.n2>
- Crotty, M. J. (1998). *The Foundations of Social Research: Meaning and Perspective in the Research Process* (1st ed.). Sage Publications Ltd.

- Daft, R. L., Sormunen, J., & Parks, D. (1988). Chief Executive Scanning, Environmental Characteristics, and Company Performance: An Empirical Study. *Strategic Management Journal*, 9(2), 123–139. <https://doi.org/10.1002/smj.4250090204>
- Daft, R. L., & Weick, K. E. (1984). Toward a Model of Organizations as Interpretation Systems. *Academy of Management Review*, 9(2), 284–295. <https://doi.org/10.5465/amr.1984.4277657>
- Dashman, L. G. (1998). The Value of an in-house competitive intelligence department: A business plan approach. *Competitive Intelligence Review*, 9(2), 10–16. [https://doi.org/10.1002/\(sici\)1520-6386\(199804/06\)9:2<10::aid-cir4>3.0.co;2-o](https://doi.org/10.1002/(sici)1520-6386(199804/06)9:2<10::aid-cir4>3.0.co;2-o)
- De Almeida, F. C., Lesca, H., & Canton, A. W. P. (2016). Intrinsic Motivation for Knowledge Sharing – Competitive Intelligence Process in a Telecom Company. *Journal of Knowledge Management*, 20(6), 1282–1301. <https://doi.org/10.1108/JKM-02-2016-0083>
- Dedijer, S. (1990). The Intelligent Corporation: A Global Survey of a 1990s Business Innovation. *Competitive Intelligence Review*, 1(1), 28–28. <https://doi.org/10.1002/cir.3880010125>
- deMarrais, K. B. (2004). Qualitative interview studies: Learning through experience. In K. B. deMarrais & S. D. Lapan (Eds.), *Foundations for research: Methods for inquiry in education and the social sciences* (1st ed., pp. 51–68). Routledge.
- Deterding, N. M., & Waters, M. C. (2021). Flexible coding of in-depth interviews: A twenty-first-century approach. *Sociological Methods & Research*, 50(2), 708–739. <https://doi.org/10.1177/0049124118799377>
- Dhami, M. K., Belton, I. K., & Mandel, D. R. (2019). The “Analysis of Competing Hypotheses” in Intelligence Analysis. *Applied Cognitive Psychology*, 33(6), 1080–1090. <https://doi.org/10.1002/acp.3550>
- Dhaoui, C., & David, A. (2005). An Approach for Modelling of Business Intelligence System to Enhance the Strategic Management of the Enterprise. *3rd International Conference on Business, Economics, Management & Marketing*, 16–18. <https://hal.archives-ouvertes.fr/inria-00000686>
- Diffenbach, J. (1983). Corporate Environmental Analysis in Large Us Corporations. *Long Range Planning*, 16(3), 107–116. [https://doi.org/10.1016/0024-6301\(83\)90037-7](https://doi.org/10.1016/0024-6301(83)90037-7)
- DiMauro, V., & Bulmer, D. (2014). *The Social Consumer Study* (p. 13). <http://www.sncr.org>
- Dishman, P., & Calof, J. (2008). Competitive Intelligence: A Multiphasic Precedent to Marketing Strategy. *European Journal of Marketing*, 42(7/8), 766–785. Emerald. <https://doi.org/10.1108/03090560810877141>
- Dishman, P., Fleisher, C. S., & Knip, V. (2003). Chronological and Categorized Bibliography of Key Competitive Intelligence Scholarship: Part 1 (1997 - 2003). *Journal of Competitive Intelligence and Management*, 1(1), 13–81. SCIP.org.
- Dou, H., Juillet, A., & Clerc, P. (2018). *L'intelligence Économique Du Futur 1: Une Nouvelle Approche Stratégique Et Opérationnelle*. ISTE Group.
- Dou, H., Juillet, A., & Clerc, P. (2019). *Strategic Intelligence for the Future 1: A New Strategic and Operational Approach* (Vol. 1). ISTE Ltd and John Wiley & Sons, Inc.
- Du Toit, A. S. (2013). Comparative Study of Competitive Intelligence Practices between Two Retail Banks in Brazil and South Africa. *Journal of Intelligence Studies in Business*, 3(2), 30–39. <https://doi.org/10.37380/jisib.v3i2.67>

- Du Toit, A. S. (2015). Competitive Intelligence Research: An Investigation of Trends in the Literature. *Journal of Intelligence Studies in Business*, 5(2), 14–21. <https://doi.org/10.37380/jisib.v5i2.127>
- Duncan, R. W., & Weiss, A. (1979). Organisational Learning: Implications for Organisational Design. *Research in Organisational Behaviour: An Annual Series of Analytical Essays and Critical Reviews*, 1, 75–123. <https://doi.org/0-89232-045-1>
- Duriau, V. J., Reger, R. K., & Pfarrer, M. D. (2007). A content analysis of the content analysis literature in organization studies: Research themes, data sources, and methodological refinements. *Organizational Research Methods*, 10(1), 5–34. <https://doi.org/10.1177/1094428106289252>
- Dutka, A. (1998). *Competitive Intelligence for the Competitive Edge* (1st ed.). Ntc Pub Group.
- Duvenage, D. (2013). Intelligence: Lessons from Knowledge Management. *International Studies Association (ISA)*, 1–17.
- Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., Baabdullah, A. M., Koohang, A., Raghavan, V., Ahuja, M., Albanna, H., Albashrawi, M. A., Al-Busaidi, A. S., Balakrishnan, J., Barlette, Y., Basu, S., Bose, I., Brooks, L., Buhalis, D., ... Wright, R. (2023). “So what if ChatGPT wrote it?” Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. *International Journal of Information Management*, 71(August), 102642. <https://doi.org/10.1016/j.ijinfomgt.2023.102642>
- Edmunds, A., & Morris, A. (2000). The Problem of Information Overload in Business Organisations: A Review of the Literature. *International Journal of Information Management*, 20(1), 17–28. [https://doi.org/10.1016/S0268-4012\(99\)00051-1](https://doi.org/10.1016/S0268-4012(99)00051-1)
- Eisenhardt, K. M. (1989). Making Fast Strategic Decisions in High-Velocity Environments. *Academy of Management Journal*, 32(3), 543–576. <https://doi.org/10.5465/256434>
- Ellis, L. (1994). *Research Methods in the Social Sciences* (1st ed.). Brown & Benchmark Pub.
- Eppler, M. J. (2003). *Managing Information Quality: Increasing the Value of Information in Knowledge-intensive Products and Processes* (1st ed.). Springer-Verlag Berlin Beideiberg. https://doi.org/10.1007/978-3-540-24782-1_1
- Eppler, M. J., & Mengis, J. (2004). The Concept of Information Overload: A Review of Literature from Organization Science, Accounting, Marketing, MIS, and Related Disciplines. *The Information Society*, 20(5), 325–344. <https://doi.org/10.1080/01972240490507974>
- Faz-Mendoza, A., Gamboa-Rosales, N. K., Castorena-Robles, A., Cobo, M. J., Castaneda-Miranda, R., & Lopez-Robles, J. R. (2020). Strategic Intelligence and Knowledge Management as drivers of Decision-Making in Mining Industry: An analysis of the literature. *International Conference on Decision Aid Sciences and Application*, 536–540. <https://doi.org/10.1109/DASA51403.2020.9317053>
- Feilzer, M. Y. (2010). Doing mixed methods research pragmatically: Implications for the rediscovery of pragmatism as a research paradigm. *Journal of Mixed Methods Research*, 4(1), 6–16. SAGE. <https://doi.org/10.1177/1558689809349691>
- Fiedler, Fred. E. (1964). A Contingency Model of Leadership Effectiveness. In *Advances in Experimental Social Psychology* (Vol. 1, pp. 149–190). Elsevier. [https://doi.org/10.1016/S0065-2601\(08\)60051-9](https://doi.org/10.1016/S0065-2601(08)60051-9)

- Fleischman, A. (2022). *Challenges of Competitive Intelligence Practice and Teaching—Understanding the Challenges, Suggesting Recommendations*. 2022 IAFIE Conference, Treviso, Italy. <https://iafie2022.org/?p=195>
- Fleisher, C. S. (2004). Competitive Intelligence Education: Competencies, Sources, and Trends. *Information Management*, 38(2), 56–62. ARMA International. <https://www.proquest.com/scholarly-journals/competitive-intelligence-education-competencies/docview/227750155>
- Fleisher, C. S. (2008). Using Open Source Data in Developing Competitive and Marketing Intelligence. *European Journal of Marketing*, 42(7/8), 852–866. <https://doi.org/10.1108/03090560810877196>
- Fleisher, C. S., & Bensoussan, B. (2015). *Business and Competitive Analysis: Effective Application of New and Classic Methods, 2nd Edition* (2nd ed.). Pearson FT Press.
- Fleisher, C. S., Knip, V., & Dishman, P. (2003). Chronological and Categorized Bibliography of Key Competitive Intelligence Scholarship: Part 2 (1990-1996). *Journal of Competitive Intelligence and Management*, 1(2), 11–88. SCIP.org.
- Fleisher, C. S., & Wright, S. (2010). Competitive Intelligence Analysis Failure: Diagnosing Individual Level Causes and Implementing Organisational Level Remedies. *Journal of Strategic Marketing*, 18(7), 553–572. <https://doi.org/10.1080/0965254X.2010.529152>
- Fleisher, C. S., Wright, S., & Tindale, R. (2007). Bibliography and Assessment of Key Competitive Intelligence Scholarship—Part 4 (2003-06). *Journal of Competitive Intelligence and Management*, 4(1), 34–107.
- Foster, R., & Kaplan, S. (2011). *Creative Destruction: Why Companies That Are Built to Last Underperform the Market - and How to Success Fully Transform Them* (Reprint). Crown Business.
- Franco, M., Magrinho, A., & Ramos Silva, J. (2011). Competitive Intelligence: A Research Model Tested on Portuguese Firms. *Business Process Management Journal*, 17(2), 332–356. <https://doi.org/10.1108/14637151111122374>
- Fraser, P., Moultrie, J., & Gregory, M. (2002). The Use of Maturity Models/Grids as a Tool in Assessing Product Development Capability. *2002 IEEE International Engineering Management Conference, 18-20 August, 1*, 244–249 vol.1. <https://doi.org/10.1109/IEMC.2002.1038431>
- Fuld+Co. (2018). Competitive Intelligence. In *Competitive Intelligence Dictionary* (p. 12). Fuld + Company. <https://www.fuld.com>
- Fuld, L. M. (1985). *Competitor Intelligence: How to Get It, How to Use It* (1st ed.). John Wiley & Sons.
- Fuld, L. M. (1988). *Monitoring the competition: Find out what's really going on over there*. Wiley.
- Fuld, L. M. (1995). *The New Competitor Intelligence: The Complete Resources for Finding, Analyzing, and Using Information About Your Competitors* (1st ed.). John Wiley & Sons, Inc.
- Garcia-Alsina, M., Cobarsí-Morales, J., & Ortoll, E. (2016). Competitive Intelligence Theoretical Framework and Practices: The Case of Spanish Universities. *Aslib Journal of Information Management*, 68(1), 57–75. <https://doi.org/10.1108/AJIM-04-2015-0061>
- Geeraerts, D. (2003). Meaning and Definition. In M.-C. L'Homme, U. Heid, & J. C. Sager (Eds.), *A Practical Guide to Lexicography* (1st ed., Vol. 6, p. 83). John Benjamins Publishing Company.

- Gehl, K. M., & Porter, M. E. (2020). *The Politics Industry* (1st ed.). Harvard Business Review Press.
- Gentzkow, M., Kelly, B., & Taddy, M. (2019). Text as Data. *Journal of Economic Literature*, 57(3), 535–574. <https://doi.org/10.1257/jel.20181020>
- Ghoshal, S., & Westney, D. E. (1991). Organizing Competitor Analysis Systems. *Strategic Management Journal*, 12(1), 17–31. <https://doi.org/0143-2095/91/010017-15>
- Gilad, B. (1989). The Role of Organized Competitive Intelligence in Corporate Strategy. *Columbia Journal of World Business*, 24(4), 29–35.
- Gilad, B. (2011). Strategy Without Intelligence, Intelligence Without Strategy. *Business Strategy Series*, 12(1), 4–11. Scopus. <https://doi.org/10.1108/17515631111106821>
- Gilad, B. (2020). *What is Competitive Intelligence?* [Organizational]. Academy of Competitive Intelligence: About ACI. <https://academyci.com/about-aci/>
- Gilad, B., & Gilad, T. (1985). A Systems Approach to Business Intelligence. *Business Horizons*, 28(5), 65–70. [https://doi.org/10.1016/0007-6813\(85\)90070-9](https://doi.org/10.1016/0007-6813(85)90070-9)
- Gilad, B., & Herring, J. (2001). CI Certification: Do We Need It? *Competitive Intelligence Magazine*, 4(2), 28–31.
- Gilad, Ben & Gilad, Tamar. (1988). *The Business Intelligence System—A New Tool for Competitive Advantage* (1st ed.). AMACOM (1829).
- Glen, R., Suci, C., & Baughn, C. (2014). The Need for Design Thinking in Business Schools. *Academy of Management Learning & Education*, 13(4), 653–667. <https://doi.org/10.5465/amle.2012.0308>
- Goria, S. (2006). Knowledge Management et Intelligence Economique: Deux notions aux passés proches et aux futurs complémentaires. *Informations, Savoirs, Décisions et Méditations [Informations, Sciences for Decisions Making]*, 27, 1–16. <https://hal.inria.fr/inria-00110300v2>
- Grabowski, D. P. (1986). Building an Effective Competitive Intelligence System. *Journal of Business & Industrial Marketing*, 1(1), 19–23. <https://doi.org/10.1108/eb006009>
- Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(S2), 109–122. Wiley Online Library. <https://doi.org/10.1002/smj.4250171110>
- Greene, R. M. (1966). *Business Intelligence and Espionage* (1st ed.). Dow Jones-Irwin Inc.
- Gundersen, S. (2018). *The Rise of a New Competitive Intelligence: Need of Real-Time Competitive Intelligence and the Impact on Decision-Making* [MSc, NOVA IMS]. <https://run.unl.pt/>. <https://run.unl.pt/handle/10362/106283>
- Guyton, W. J. (1962). A Guide to Gathering Marketing Intelligence. *Industrial Marketing*, 1(1), 84–88.
- Haddadi, A. E., Dousset, B., & Berrada, I. (2011). Xplor Everywhere—The Competitive Intelligence System for Mobile. *2011 International Conference on Multimedia Computing and Systems*, 1–5. <https://doi.org/10.1109/ICMCS.2011.5945635>
- Hair, J. F. (2007). Knowledge Creation in Marketing: The Role of Predictive Analytics. *European Business Review*, 19(4), 303–315. <https://doi.org/10.1108/09555340710760134>
- Harbulot, C. (1992). *La Machine De Guerre Économique: Etats-Unis, Japon, Europe*. Economica.

- Harkleroad, D. (1998). Ostriches and Eagles II. *Competitive Intelligence Review*, 9(1), 13–19.
[https://doi.org/10.1002/\(SICI\)1520-6386\(199801/03\)9:1<13::AID-CIR4>3.0.CO;2-S](https://doi.org/10.1002/(SICI)1520-6386(199801/03)9:1<13::AID-CIR4>3.0.CO;2-S)
- Hax, A. C., & Majluf, N. S. (1984). *Strategic Management: An Integrated Approach*. New Jersey: Prentice Hall.
- Hedin, H. (2005). *Competitive Intelligence in Large Companies – Global Study* (White Paper 4; Global Study, pp. 1–38). Global Intelligence Alliance.
- Hedin, H., Hirvensalo, I., & Vaarnas, M. (2014). *The Handbook of Market Intelligence: Understand, Compete and Grow in Global Markets* (2nd ed.). John Wiley & Sons Ltd.
- Hedin, H., & Thieme, J. (2010). From Firefighters to Futurists: A Practical Roadmap for CI Development. *Competitive Intelligence Magazine*, 13(1), 25–31.
- Heppes, D., & Du Toit, A. S. (2009). Level of Maturity of the Competitive Intelligence Function: Case Study of a Retail Bank in South Africa. *Aslib Journal of Information Management*, 61(1), 48–66. <https://doi.org/10.1108/00012530910932285>
- Herring, J. (2008). Defining Competitive Intelligence Needs: The Role of Key Intelligence Topics. In *Starting a Competitive Intelligence Function: A SCIP Best Practices Guide* (1st ed., Vol. 1, pp. 33–42). Competitive Intelligence Foundation.
- Herring, J. P. (1999). Key intelligence topics: A process to identify and define intelligence needs. *Competitive Intelligence Review*, 10(2), 4–14. [https://doi.org/10.1002/\(SICI\)1520-6386\(199932\)10:2<4::AID-CIR3>3.0.CO;2-C](https://doi.org/10.1002/(SICI)1520-6386(199932)10:2<4::AID-CIR3>3.0.CO;2-C)
- Herring, J. P. (1998). What Is Intelligence Analysis? There Is More to Creating ‘Actionable Intelligence’ Than Just the Hottest Analytical Techniques. *Competitive Intelligence Magazine*, 1(2), 13–16.
- Herring, J. P., & Leavitt, J. A. (2011). The roadmap to a world-class competitive intelligence program. *Competitive Intelligence Magazine*, 14(1), 9–28. SCIP.org.
- Heuer, R. J. (1999). *Psychology of Intelligence Analysis* (1st ed.). Center for the Study of Intelligence.
- Heuer, R. J., & Pherson, R. H. (2016). *Structured Analytic Techniques for Intelligence Analysis* (SPI). CQ Press Sage Washington, D.C.
- Holsti, O. R. (1969). *Content Analysis for the Social Sciences and Humanities* (1st ed.). Addison-Wesley Pub. Co.
- Hoppe, M. (2015). Intelligence as a Discipline, Not Just a Practice. *Journal of Intelligence Studies in Business*, 5(3), 47–56. <https://doi.org/10.37380/jisib.v5i3.137>
- Huang, Z., Savita, K. S., & Zhong-jie, J. (2022). The business intelligence impact on the financial performance of start-ups. *Information Processing & Management*, 59(1), 102761. <https://doi.org/10.1016/j.ipm.2021.102761>
- IAFIE. (2023). *Certified Courses & Programs* [Community Portal]. IAFIE - International Association for Intelligence Education. <https://www.iafie.org/page/CertifiedCoursesPrograms>
- Iansiti, M., & Euchner, J. (2018). Competing in ecosystems: An interview with Marco Iansiti. *Research-Technology Management*, 61(2), 10–16. <https://doi.org/10.1080/08956308.2018.1421378>
- ISACA. (2022). *CMMI Levels of Capability and Performance*. <https://cmmiinstitute.com/learning/appraisals/levels>

- Jackson, J. (2010). *Professions and Professionalization: Volume 3, Sociological Studies*. Cambridge University Press.
- Jacobides, M. G., Cennamo, C., & Gawer, A. (2018). Towards a Theory of Ecosystems. *Strategic Management Journal*, 39(8), 2255–2276. <https://doi.org/10.1002/smj.2904>
- Jakobiak, F., & Dou, H. (1992). De L'information Documentaire À La Veille Technologique Pour L'entreprise. In Desvals H. et Dou H., *La veille technologique: L'information scientifique, technique et industrielle*. Editions Dunod.
- Jin, T., & Bouthillier, F. (2012). The Integration of Intelligence Analysis into LIS Education. *Journal of Education for Library and Information Science*, 53(2), 130–148. <https://doi.org/10.2307/23249104>
- Jones, R. V. (1947). Scientific Intelligence. *Journal of the Royal United States Services Institution*, 9, 352–360.
- Jordan, J., & Finkelstein, S. (2005). *The Ethics of Competitive Intelligence* (Case Study 1–0095). Tuck School of Business at Dartmouth.
- Juhari, A. S., & Stephens, D. (2006). Tracing the origins of competitive intelligence throughout history. *Journal of Competitive Intelligence and Management*, 3(4), 61–82.
- Juillet, A. (2006). *Référentiel de formation en intelligence économique* (Working Paper 85/SGDN/IE). Secrétariat général de la défense nationale. http://dou.carine.free.fr/dou/France/referentiel_IE.pdf
- Kahaner, L. (1996). *Competitive Intelligence: From Black Ops to Boardrooms - How Business Gather, Analyze, and Use Information to Succeed in the Global Marketplace* (Touchstone). Simon & Schuster.
- Kahaner, L. (1997). *Competitive Intelligence: How to Gather, Analyse, and Use Information to Move Your Business to the Top* (1st ed.). Simon & Schuster - Touchstone.
- Kautilya, V. (1915). *Arthashastra* (R. Shamasastri, Trans.; Translated by R. Shamasastri). Government Press.
- Kelley, W. T. (1965). Marketing Intelligence for Top Management. *The Journal of Marketing*, 29(October), 19–24. <https://doi.org/10.2307/1249697>
- Kelley, W. T. (1968). *Marketing Intelligence: The Management of Marketing Information*. Staples Press.
- Kerlinger, F. N., Lee, H. B., & Bhanthumnavin, D. (2000). *Foundations of Behavioral Research* (4th ed.). Thomson Learning.
- King, W. R., & Cleland, D. I. (1974). Environmental Information Systems for Strategic Marketing Planning: Describes an Information System for Providing Externally Generated Data to Support Strategic Marketing Planning. *Journal of Marketing*, 38(4), 35–40.
- Klavans, D. (1995). What Is Unique About CI? Part Two. *Competitive Intelligence Review*, 6(2), 1. <https://doi.org/10.1002/cir.3880060202>
- Klue, & SCIP. (2021). *The 2021 Competitive Enablement Report—What do Stakeholders Really Think About Your Competitive Programs* (p. 41) [Survey]. Klue + SCIP.

- Knack, A., Carter, R. J., & Babuta, A. (2022). *Human-Machine Teaming in Intelligence Analysis—Requirements for Developing Trust in Machine Learning Systems* [Research Report]. Centre for Emerging Technology and Security (CETaS).
- Knip, V., Dishman, P., & Fleisher, C. S. (2003). Chronological and Categorized Bibliography of Key Competitive Intelligence Scholarship: Part 3 (The Earliest Writings-1989). *Journal of Competitive Intelligence and Management*, 1(3), 10–81. SCIP.org.
- Kohli, A. K., Jaworski, B. J., & Kumar, A. (1993). MARKOR: A Measure of Market Orientation. *Journal of Marketing Research*, 30(4), 467–477. <https://doi.org/10.2307/3172691>
- Kolko, J. (2011). *Thoughts on Interaction Design: A Collection of Reflections* (2nd ed.). Morgan Kaufmann.
- Koseoglu, M. A., Ross, G., & Okumus, F. (2016). Competitive Intelligence Practices in Hotels. *International Journal of Hospitality Management*, 53, 161–172. <https://doi.org/10.1016/j.ijhm.2015.11.002>
- Krippendorff, K. (2018). *Content Analysis: An Introduction to Its Methodology* (4th ed.). SAGE.
- Kuhn, T. S. (1962). *The Structure of Scientific Revolutions: Vol. II* (2nd, Enlarged ed.). University of Chicago Press.
- Kurtti, T., Määttä, S., Aaltonen, J., Turunen, A., & Riipi, S. (2013). Tripartition of Knowledge in Knowledge-Intensive Services. In *Business Innovation, Development, and Advancement in the Digital Economy* (pp. 117–125). IGI Global; Scopus.
- Kvale, S., & Brinkmann, S. (2015). *InterViews: Learning the Craft of Qualitative Research Interviewing* (3rd ed.). Sage Publications.
- Lahrman, G., & Marx, F. (2010). Systematisation of Maturity Model Extensions. In R. Winter, J. L. Zhao, & S. Aier (Eds.), *DESRIST 2010* (Vol. 6105, pp. 522–525). Springer. https://doi.org/10.1007/978-3-642-13335-0_36
- Laney, D. (2001). 3D data management: Controlling data volume, velocity, and variety. *META Group Research Note*, 6(70), 1–4.
- Lazer, D. M. J., Baum, M. A., Benkler, Y., Berinsky, A. J., Greenhill, K. M., Menczer, F., Metzger, M. J., Nyhan, B., Pennycook, G., Rothschild, D., Schudson, M., Sloman, S. A., Sunstein, C. R., Thorson, E. A., Watts, D. J., & Zittrain, J. L. (2018). The Science of Fake News. *Science*, 359(6380), 1094–1096. <https://doi.org/10.1126/science.aao2998>
- Lee, A. S., & Baskerville, R. L. (2003). Generalizing Generalizability in Information Systems Research. *Information Systems Research*, 14(3), 221–243. <https://doi.org/10.1287/isre.14.3.221.16560>
- Legg, S., & Hutter, M. (2007). Universal Intelligence: A Definition of Machine Intelligence. *Minds and Machines*, 17(4), 391–444. <https://doi.org/10.1007/s11023-007-9079-x>
- Liebana-Cabanillas, F., Corral-Hermoso, J. A., Villarejo-Ramos, Á. F., & Higuera-Castillo, E. (2018). New social consumer? Determining factors of Facebook commerce. *Journal of Decision Systems*, 27(4), 213–237. <https://doi.org/10.1080/12460125.2019.1592990>
- Liebowitz, J. (2006). *Strategic Intelligence: Business Intelligence, Competitive Intelligence, and Knowledge Management*. Auerbach Publications.

- Liedtka, J. (2015). Perspective: Linking Design Thinking with Innovation Outcomes through Cognitive Bias Reduction. *Journal of Product Innovation Management*, 32(6), 925–938. <https://doi.org/10.1111/jpim.12163>
- Lincoln, Y. S., & Guba, E. G. (2013). *The Constructivist Credo*. Left Coast Press.
- Loevinger, J. (1957). Objective tests as instruments of psychological theory. *Psychological Reports*, 3(3), 635–694. <https://doi.org/10.2466/pr0.1957.3.3.635>
- Lopez-Robles, J. R., Otegi-Olaso, J. R., Porto-Gomez, I., & Coboc, M. J. (2019). 30 years of intelligence models in management and business: A bibliometric review. *International Journal of Information Management*, 48(October), 22–38. ScienceDirect. <https://doi.org/10.1016/j.ijinfomgt.2019.01.013>
- Lopez-Robles, J. R., Otegi-Olaso, J. R., Porto-Gomez, I., Gamboa-Rosales, H., & Gamboa-Rosales, N. K. (2020). Understanding the Intellectual Structure and Evolution of Competitive Intelligence: A Bibliometric Analysis from 1984 to 2017. *Technology Analysis & Strategic Management*, 32(5), 604–619. <https://doi.org/10.1080/09537325.2019.1686136>
- Luchs, M. G., Swan, S., & Griffin, A. (2016). *Design Thinking: New Product Development Essentials from the PDMA*. Wiley. <https://www.wiley.com/en-pt/Design+Thinking%3A+New+Product+Development+Essentials+from+the+PDMA-p-9781118971819>
- Luhn, H. P. (1958). A Business Intelligence System. *IBM Journal of Research and Development*, 2(4), 314–319. <https://doi.org/10.1147/rd.24.0314>
- Lutz, C. J., & Bodendorf, F. (2020). Analyzing Industry Stakeholders Using Open-Source Competitive Intelligence: A Case Study in the Automotive Supply Industry. *Journal of Enterprise Information Management*, 33(3), 579–599. <https://doi.org/10.1108/JEIM-08-2019-0234>
- Madureira, L. (2013). Social Market Intelligence: An Introduction to “Future Ready CI”. *Scip.Insight*, 5(1), 1.
- Madureira, L. (2017). SMINT: Why CI Needs a New Approach. *Competitive Intelligence Magazine*, 20(1), 12–16.
- Madureira, L. (2019). Design Thinking: The New Mindset for CI? *Competitive Intelligence Magazine*, 23(1), 6–15. SCIP.org. https://cdn.ymaws.com/www.scip.org/resource/collection/1625C665-B30F-4B56-A1B3-021A20F6DBE0/Design_Thinking_The_New_Mindset_for_CI.pdf
- Madureira, L., & Gonçalves, A. (2017). Luis Madureira: SMINT Author & Design Thinker on Competitive Intelligence, Strategy, Innovation & Growth. In *Social Media Analytics Strategy—Using Data to Optimize Business Performance* (https://link.springer.com/chapter/10.1007/978-1-4842-3102-9_3; 1st ed., pp. 47–52). Apress | Springer. https://doi.org/10.1007/978-1-4842-3102-9_3
- Madureira, L., Popovic, A., & Castelli, M. (2021a). Competitive intelligence: A unified view and modular definition. *Technological Forecasting and Social Change*, 173(December 121086), 1–17. <https://doi.org/10.1016/j.techfore.2021.121086>
- Madureira, L., Popovic, A., & Castelli, M. (2021b). Competitive intelligence empirical construct validation using expert in-depth interviews study. *IEEE International Conference on Technology Management, Operations and Decisions*, 1–6. <https://doi.org/10.1109/ICTMOD52902.2021.9739422>

- Madureira, L., Popovic, A., & Castelli, M. (2023). Competitive intelligence maturity models: Systematic review, unified model, and implementation frameworks. *Journal of Intelligence Studies in Business*, 13(1), 1–29. <https://doi.org/10.37380/jisib.v13i1.988>
- Manning, C. D., Schütze, H., & Raghavan, P. (2008). *Introduction to Information Retrieval* (1st ed.). Cambridge University Press.
- Marceau, S., & Sawka, K. (1999). Developing a World-Class CI Program in Telecoms. *Competitive Intelligence Review*, 10(4), 30–40. [https://doi.org/10.1002/\(SICI\)1520-6386\(199934\)10:4<30::AID-CIR6>3.0.CO;2-H](https://doi.org/10.1002/(SICI)1520-6386(199934)10:4<30::AID-CIR6>3.0.CO;2-H)
- Marcial, E. C. (2007). *Utilização de Modelo Multivariado para Identificação dos Elementos-Chave que Compõem Sistemas de Inteligência Competitiva* [Master]. Universidade de Brasília.
- Marcial, E. C. (2013). *Aspectos Fundamentais da Inteligência Competitiva e a Ciência da Informação* [PhD Dissertation - Information & Library Science]. Universidade de Brasília.
- Marcial, E. C. (2014). The Theoretical Evolution of Competitive Intelligence – Unifying Framework | (Evolução Teórica da Inteligência Competitiva – Quadro Unificador). *Revista Multipla, Brasília*, 28(37), 49–78.
- Marcial, E. C. (2018). Initial proposal of a general theory of competitive intelligence [Proposta inicial de uma teoria geral da inteligência competitiva]. *Ciência da Informação*, 45(3), 59–75. <http://dx.doi.org/10.22478/ufpb.1981-0695.2018v13n1.39268>
- Marcial, E. C., & Suaiden, E. J. (2016). The Scientific Structure of Competitive Intelligence. *Transinformação*, 28(1), 97–106. <https://doi.org/10.1590/2318-08892016002800008>
- Markovich, A., Efrat, K., Raban, D. R., & Souchon, A. L. (2019). Competitive Intelligence Embeddedness: Drivers and Performance Consequences. *European Management Journal*, 37(6), 708–718. <https://doi.org/10.1016/j.emj.2019.04.003>
- Martin, R. L. (2009a). *The Design of Business: Why Design Thinking is the Next Competitive Advantage*. Harvard Business Press.
- Martin, R. L. (2009b). *The Opposable Mind: Winning Through Integrative Thinking*. Harvard Business Press.
- Martin, R. L. (2010). Design Thinking: Achieving Insights via the “Knowledge Funnel”. *Strategy & Leadership*, 38(2), 37–41. <https://doi.org/10.1108/10878571011029046>
- Martin, R. L., & Christensen, K. (2013). *Rotman on Design: The Best on Design Thinking from Rotman Magazine*. University of Toronto Press.
- Martin, R. L., & Reeves, M. (2022). Strategy in a Hyperpolitical World. *Harvard Business Review*.
- Martinet, B., & Ribault, J.-M. (1988). *La Veille Technologique, Concurrentielle et Commerciale Sources, Méthodologie, Organisation*. Librairie Eyrolles.
- Martre, H., Clerc, P., & Harbulot, C. (1994). *Intelligence Économique et Stratégie des Entreprises* (17; La Documentation Française, p. 167). Commissariat Général du Plan.
- Maungwa, T., & Fourie, I. (2018). Competitive Intelligence Failures: An Information Behaviour Lens to Key Intelligence and Information Needs. *Aslib Journal of Information Management*, 70(4), 367–389. <https://doi.org/10.1108/AJIM-01-2018-0018>
- M-Brain, Drieman, J., & Makinen, S. (2019). *Global Intelligence Survey 2019* (p. 32) [Survey & White Paper]. M-Brain.

- McCallum, A. K. (2002). *MALLET: A Machine Learning for Language Toolkit* [Education]. Machine Learning for Language Toolkit. <http://mallet.cs.umass.edu>
- McGinn, D., & Ignatius, A. (2016). The Best-Performing CEOs in the World. *Harvard Business Review*, 94(November), 41–57.
- McGonagle, J. J. (2007). An Examination of the Classic CI Model. *Journal of Competitive Intelligence and Management*, 4(2), 71–86.
- McGonagle, J. J. (2016). Competitive Intelligence. *Intelligencer: Journal of U.S. Intelligence Studies*, 22(2), 55–60.
- McGonagle, J. J., & Vella, C. M. (1996). *A New Archetype for Competitive Intelligence* (1st ed.). Praeger.
- McGonagle, J. J., & Vella, C. M. (1998). *Protecting Your Company Against Competitive Intelligence*. Quorum Books.
- McGonagle, J. J., & Vella, C. M. (2012). *Proactive Intelligence: The Successful Executive's Guide to Intelligence*. Springer Science & Business Media; Springer.
- McGregor, S. L. (2011). Consumer Acumen: Augmenting Consumer Literacy. *Journal of Consumer Affairs*, 45(2), 344–357. Wiley Online Library. <https://doi.org/10.1111/j.1745-6606.2011.01206.x>
- Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative Research: A Guide to Design and Implementation* (4th ed.). John Wiley & Sons.
- Merriam-Webster. (2023). Praxis. In *Merriam-Webster.com dictionary*. <https://www.merriam-webster.com/dictionary/praxis>
- Mertens, D. M. (2014). *Research and Evaluation in Education and Psychology: Integrating Diversity with Quantitative, Qualitative, and Mixed Methods* (4th ed.). SAGE.
- Michaeli, R. (2006). *Competitive Intelligence: Strategische Wettbewerbsvorteile Erzielen Durch Systematische Konkurrenz-, Markt- Und Technologieanalysen* (Softcover). Springer.
- Michaeli, R. (2013). *Competitive Intelligence: Competitive Advantage through Analysis of Competition, Markets and Technologies* (English version). Springer.
- Micheli, P., Wilner, S. J. S., Bhatti, S. H., Mura, M., & Beverland, M. B. (2019). Doing Design Thinking: Conceptual Review, Synthesis, and Research Agenda. *Journal of Product Innovation Management*, 36(2), 124–148. <https://doi.org/10.1111/jpim.12466>
- Michlewski, K. (2008). Uncovering Design Attitude: Inside the Culture of Designers. *Organization Studies*, 29(3), 373–392. <https://doi.org/10.1177/0170840607088019>
- Miles, M. B., Huberman, M., & Saldaña, J. (2020). *Qualitative Data Analysis: A Methods Sourcebook* (4th ed.). SAGE Publications, Inc.
- Miller, J. P. (1994). Educational Programs for Intelligence Professionals. *Library Trends*, 43(2), 253–270. <https://hdl.handle.net/2142/5394>
- Miorandi, D., Maltese, V., Rovatsos, M., Nijholt, A., & Stewart, J. (Eds.). (2014). *Social Collective Intelligence. Combining the Powers of Humans and Machines to Build a Smarter Society* (1st ed.). Springer.

- Mirchevska, T. P., & Markova, S. (2011). Emergence of the social consumer—The impact of personalisation, localization and social collaboration on consumerism. *Annals of the University of Petroșani. Economics*, 11(Part III), 229–236.
- Montgomery, D. B., & Weinberg, C. B. (1979). Toward Strategic Intelligence Systems. *Journal of Marketing*, 43(4), 41–52. <https://doi.org/10.2307/1250269>
- Morgan, D. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, 1(1), 48–76. Sage Publications. <https://doi.org/10.1177/2345678906292462>
- Morrow, M. A. R. (2022). Private Sector Intelligence: On the Long Path of Professionalization. *Intelligence and National Security*, 37(3), 402–420. <https://doi.org/10.1080/02684527.2022.2029099>
- Muller, M.-L. (2007). Competitive Intelligence and International Business. *SA Journal of Information Management*, 9(1), 1–7. <https://doi.org/10.4102/sajim.v9i1.10>
- Munoz, J. M. (2017). *Global Business Intelligence* (1st ed.). Routledge. <https://doi.org/10.4324/9781315471136>
- Nasri, W. (2012). Conceptual model of strategic benefits of competitive intelligence process. *International Journal of Business and Commerce*, 1(6), 25–35.
- Nasri, W., & Zarai, M. (2013). Key Success Factors for Developing Competitive Intelligence in Organisation. *American Journal of Business and Management*, 2(3), 239–244. <https://doi.org/10.11634/216796061302397>
- Negash, S. (2004). Business Intelligence. *Communications of the Association for Information Systems*, 13, Article 15(1), 177–195. <https://doi.org/10.17705/1CAIS.01315>
- Nenzhelele, T. E. (2016). Competitive Intelligence Practice Challenges in the South African Property Sector. *Problems and Perspectives in Management*, 14(2), 298–305. [https://doi.org/10.21511/ppm.14\(2-2\).2016.05](https://doi.org/10.21511/ppm.14(2-2).2016.05)
- Neuendorf, K. A. (2017). *The Content Analysis Guidebook* (2nd ed.). SAGE.
- Neuendorf, K. A. (2019). Content analysis and thematic analysis. In P. Brough (Ed.), *Advanced Research Methods for Applied Psychology: Design, Analysis and Reporting* (1st ed., pp. 211–223). Routledge.
- Nicholas, D. (2000). *Assessing Information Needs: Tools, Techniques and Concepts for the Internet Age* (2nd ed.). Routledge.
- Nikolaos, T., & Evangelia, F. (2012). Competitive Intelligence: Concept, Context and a Case of its Application. *Science Journal of Business Management*, 2012(March), 1–15. <https://doi.org/10.7237/sjbm/261>
- Nonaka, I. (2007). The Knowledge-Creating Company. *Harvard Business Review*, 85(7/8), 162–171. <https://doi.org/10.1016/b978-0-7506-7009-8.50016-1>
- Nonaka, I., & Takeuchi, H. (1995). *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation* (1st ed.). Oxford University Press.
- Nunes, M. P., & Lequain, L. de S. (2016). The Application of Competitive Intelligence in Export Markets Selection: A Comparative Analysis of Four Methods. *A utilização da inteligência*

competitiva na seleção de mercados para exportação: Uma análise comparativa de quatro métodos, 11(3), 22–35.

- Nunnally, J. C. (1978). An overview of psychological measurement. In B. B. Wolman (Ed.), *Clinical Diagnosis of Mental Disorders* (pp. 97–146). Springer US. https://doi.org/10.1007/978-1-4684-2490-4_4
- ODSC. (2020, March 4). The 2020 Data Science Dictionary—Key Terms You Need to Know [Organizational]. ODSC. <https://www.datasciencecentral.com/profiles/blogs/top-data-science-skills-for-2020-1>
- Olszak, C. M. (2014). An Overview of Information Tools and Technologies for Competitive Intelligence Building: Theoretical Approach. *Issues in Informing Science and Information Technology*, 11(1), 139–153. <https://doi.org/10.28945/1985>
- Oraee, N., Sanatjoo, A., & Ahanchian, M. R. (2020). The competitive intelligence diamond model with the approach to standing on the shoulders of giants. *Library & Information Science Research*, 42(2), 1–12. <https://doi.org/10.1016/j.lisr.2020.101004>
- Osterwalder, A. (2004). *The Business Model Ontology a Proposition in a Design Science Approach* [PhD Dissertation]. Université de Lausanne, Faculté des hautes études commerciales.
- Osterwalder, A., & Pigneur, Y. (2010). *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers* (1st ed.). John Wiley & Sons.
- Oubrich, M., Hakmaoui, A., Bierwolf, R., & Haddani, M. (2018). Development of a Competitive Intelligence Maturity Model: Insights from Moroccan Companies. *Journal of Intelligence Studies in Business*, 8(1), 25–36. <https://doi.org/10.37380/jisib.v8i1.303>
- Oxford English Dictionary. (2022a). Maturity. In *Oxford English Dictionary* (Oxford Languages and Google). Oxford University Press.
- Oxford English Dictionary. (2022b). Model. In *Oxford English Dictionary* (Oxford Languages and Google). Oxford University Press.
- Pagani, M., & Champion, R. (2021). Creating business value through human-centric AI. In M. Pagani & R. Champion, *Artificial intelligence for sustainable value creation* (pp. 9–31). Edward Elgar Publishing. <https://doi.org/10.4337/9781839104398.00010>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews. *Systematic Reviews*, 10(1), 89. <https://doi.org/10.1186/s13643-021-01626-4>
- Page, M. J., Moher, D., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... McKenzie, J. E. (2021). PRISMA 2020 Explanation and Elaboration: Updated Guidance and Exemplars for Reporting Systematic Reviews. *BMJ*, 372(160), 1–36. <https://doi.org/10.1136/bmj.n160>
- Parker, K. R., Nitse, P. S., & Davey, B. (2008). History of Computing Education Trends: The Emergence of Competitive Intelligence. In J. Impagliazzo (Ed.), *History of Computing and*

- Education 3 (HCE3)* (Vol. 269, pp. 113–127). Springer US. https://doi.org/10.1007/978-0-387-09657-5_7
- Patton, M. Q. (1990). *Qualitative Evaluation and Research Methods* (2nd ed.). SAGE Publications, inc.
- Patton, M. Q. (2015). *Qualitative Research & Evaluation Methods: Integrating Theory and Practice* (4th ed.). SAGE Publications, Inc.
- Paul, S., Yuan, L., Jain, H., Robert, L., Spohrer, J., & Lifshitz-Assaf, H. (2022). Intelligence Augmentation: Human Factors in AI and Future of Work. *AIS Transactions on Human-Computer Interaction*, 14(3), 426–445. <https://doi.org/10.17705/1thci.00174>
- Pellissier, R., & Nenzhelele, T. E. (2013a). Towards a Universal Competitive Intelligence Process Model. *South African Journal of Information Management*, 15(2), 1–7. <https://doi.org/10.4102/sajim.v15i2.567>
- Pellissier, R., & Nenzhelele, T. E. (2013b). Towards a universal definition of competitive intelligence. *South African Journal of Information Management*, 15(2), 1–7. <https://doi.org/10.4102/sajim.v15i2.559>
- Pereira, A. R., Ferreira, J. J. P., & Lopes, A. (2020). A Knowledge Representation of the Beginning of the Innovation Process: The Front End of Innovation Integrative Ontology (FEI2O). *Data and Knowledge Engineering*, 125, 1–20. Scopus. <https://doi.org/10.1016/j.datak.2019.101760>
- Pinkerton, R. L. (1969). How to develop a Marketing Intelligence System. *Industrial Marketing*, 54, 41–44.
- Platt, W. (1957). *Strategic Intelligence Production: Basic Principles*. Praeger.
- Popper, K. (1962). *Conjectures and Refutations: The Growth of Scientific Knowledge* (1st ed.). Basic Books.
- Porter, M. E. (1980). *Competitive Strategy: Techniques for Analyzing Industries and Competitors* (1st ed.). Free Press.
- Porter, M. E. (2008). The Five Competitive Forces That Shape Strategy. *Harvard Business Review*, 86(1), 25–40.
- Porter, M. E., & Millar, V. E. (1985). How Information Gives You Competitive Advantage. *Harvard Business Review*, July 1985.
- Prescott, J. E. (1989). Competitive Intelligence: Its Role and Function in Organizations. *Advances in Competitive Intelligence*, 1–13.
- Prescott, J. E. (1999). The evolution of competitive intelligence. Designing a process for action. *Proposal Management (Journal of the Association of Proposal Management Professionals)*, Spring, 37–52.
- Prescott, J. E. (2014). Intelligence Studies in Business. In G. Moore (Ed.), *Encyclopedia of U.S. Intelligence—Two Volume Set* (1st ed., Vol. 1, pp. 83–90). Auerbach Publications for Taylor and Francis. <https://doi.org/10.1081/E-EUSI-120048323>
- Prescott, J. E., & Gibbons, P. T. (1991). Europe '92 Provides New Impetus for Competitive Intelligence. *Journal of Business Strategy*, 12(6), 20–26. <https://doi.org/10.1108/eb039451>
- Prescott, J. E., & Gibbons, P. T. (1993). *Global Perspectives on Competitive Intelligence*. Society of Competitive Intelligence Professionals.

- Prescott, J. E., & Grant, J. H. (1988). A Manager's Guide for Evaluating Competitive Analysis Techniques. *Interfaces*, 18(3), 10–22. <https://doi.org/10.1287/inte.18.3.10>
- Prescott, J. E., & Herko, R. (2009). The CI professionals' competency framework™. *Competitive Intelligence Magazine*, 12(1), 23–26.
- Prescott, J. E., & Hussey, D. E. (1996). The Evolution of Competitive Intelligence. In *Rethinking Strategic Management: Ways to Improve Competitive Performance* (pp. 71–90). John Wiley & Sons.
- Prescott, J. E., & Miller, S. H. (2001). *Proven Strategies in Competitive Intelligence: Lessons from the Trenches* (1st ed.). John Wiley & Sons, Inc.
- Prescott, J. E., & Smith, D. C. (1987). A Project-Based Approach to Competitive Analysis. *Strategic Management Journal*, 8(5), 411–423. <https://doi.org/10.1002/smj.4250080502>
- Prescott, J. E., & Smith, D. C. (1989). The Largest Survey of “Leading-Edge” Competitor Intelligence Managers. *Strategy & Leadership*, 17(3), 6–13. <https://doi.org/10.1108/eb054253>
- Prior, V. (1998a). The Language of Competitive Intelligence: Part One. *Competitive Intelligence Review*, 9(2), 66–68. [https://doi.org/10.1002/\(SICI\)1520-6386\(199804/06\)9:2<66::AID-CIR12>3.0.CO;2-O](https://doi.org/10.1002/(SICI)1520-6386(199804/06)9:2<66::AID-CIR12>3.0.CO;2-O)
- Prior, V. (1998b). The Language of Competitive Intelligence: Part Three. *Competitive Intelligence Review*, 9(4), 84–86. [https://doi.org/10.1002/\(SICI\)1520-6386\(199810/12\)9:4<84::AID-CIR12>3.0.CO;2-Q](https://doi.org/10.1002/(SICI)1520-6386(199810/12)9:4<84::AID-CIR12>3.0.CO;2-Q)
- Prior, V. (1998c). The Language of Competitive Intelligence: Part Two. *Competitive Intelligence Review*, 9(3), 78–80. [https://doi.org/10.1002/\(SICI\)1520-6386\(199807/09\)9:3<78::AID-CIR13>3.0.CO;2-1](https://doi.org/10.1002/(SICI)1520-6386(199807/09)9:3<78::AID-CIR13>3.0.CO;2-1)
- Prior, V. (1999). The Language of Competitive Intelligence: Part Four. *Competitive Intelligence Review*, 10(1), 84–87. [https://doi.org/10.1002/\(SICI\)1520-6386\(199931\)10:1<84::AID-CIR12>3.0.CO;2-M](https://doi.org/10.1002/(SICI)1520-6386(199931)10:1<84::AID-CIR12>3.0.CO;2-M)
- Prior, V. (2010). *Glossary of terms used in competitive intelligence and knowledge management* [Glossary]. SCIP.org. https://cdn.ymaws.com/www.scip.org/resource/resmgr/White_Papers/Prior_Intelligence_Glossary_.pdf
- Purpura, P. P. (2019). Topics of Concern (Ch18). In P. P. Purpura (Ed.), *Security and Loss Prevention—An Introduction (Seventh Edition)* (pp. 623–672). Butterworth-Heinemann. <https://doi.org/10.1016/B978-0-12-811795-8.00018-7>
- PwC. (2019). *CEOs' curbed confidence spells caution* (22nd Annual Global CEO Survey, p. 48) [Survey]. PwC. <https://www.pwc.com/gx/en/ceo-survey/2019/report/pwc-22nd-annual-global-ceo-survey.pdf>www.ceosurvey.pwc
- Ranjan, J., Foropon, C., Sarkarc, J. G., & Sarkarc, A. (2021). Big data analytics in building the competitive intelligence of organizations. *International Journal of Information Management*, 56(102231), 2–13. <https://doi.org/10.1016/j.ijinfomgt.2020.102231>
- Ribault, T. (1992). Séminaire veille stratégique. *EN PSTT*.
- Riffe, D., Lacy, S., Fico, F. G., & Watson, B. R. (2019). *Analyzing Media Messages. Using Quantitative Content Analysis in Research* (4th ed.). Routledge.

- Ritchie, J. (Ed.). (2013). *Qualitative Research Practice: A Guide for Social Science Students and Researchers* (2nd ed.). SAGE.
- Rodale, J. I. (1978). *The Synonym Finder* (Revised). Rodale Books.
- Rosemann, M., & Vessey, I. (2008). Toward improving the relevance of information systems research to practice: The role of applicability checks. *Mis Quarterly*, 32(1), 1–22. <https://doi.org/10.2307/25148826>
- Rothberg, H. N., & Erickson, G. S. (2017). Big data systems: Knowledge transfer or intelligence insights? *Journal of Knowledge Management*, 21(1), 92–112. <https://doi.org/10.1108/JKM-07-2015-0300>
- Rouach, D., & Santi, P. (2001). Competitive Intelligence Adds Value: Five Intelligence Attitudes. *European Management Journal*, 19(5), 552–559. [https://doi.org/10.1016/S0263-2373\(01\)00069-X](https://doi.org/10.1016/S0263-2373(01)00069-X)
- Roukis, G. S., Conway, H., & Charnov, B. H. (1990). *Global Corporate Intelligence: Opportunities, Technologies, and Threats in the 1990s*. Quorum Books.
- Rubin, H. J., & Rubin, I. (2012). *Qualitative Interviewing: The Art of Hearing Data* (3rd ed.). SAGE.
- Rumelt, R. P. (2012). *Good Strategy/Bad Strategy: The Difference and Why It Matters* (799615; 1st ed.). Crown Business.
- Rumelt, R. P. (2022, June 23). Build a Strategy that Addresses Your Gnarliest Challenges. *Harvard Business Review*. <https://hbr.org/2022/06/build-a-strategy-that-addresses-your-gnarliest-challenges>
- Salles, M. (2000). Problématique de la conception de méthodes pour la définition de Systèmes d'Intelligence Economique. *Revue d'intelligence Économique*, 6–7, 15–28.
- Saxena, D., & Lamest, M. (2018). Information overload and coping strategies in the big data context: Evidence from the hospitality sector. *Journal of Information Science*, 44(3), 287–297. <https://doi.org/10.1177/0165551517693712>
- Schwarz, J. O. (2007). Competitive Intelligence: A Field for Futurists? *Futures Research Quarterly*, 23(1), 55.
- SCIP. (2022). *What is Competitive Intelligence?* [Organizational]. SCIP.Org. <https://www.scip.org/page/CI-MI-Basics-Topic-Hub>
- SCIP. (2023). *Competitive Intelligence Training & Certification* [Community Portal]. SCIP. <https://www.scip.org/page/CompetitiveIntelligenceTraining-Certification>
- Senge, P. M. (2006). *The Fifth Discipline: The Art & Practice of The Learning Organisation* (Revised and Updated). Doubleday.
- Serpa, L. F. (2000). Epistemological Assessment of Current Business Intelligence Archetypes. *Competitive Intelligence Review*, 11(4), 88–101. [https://doi.org/10.1002/1520-6386\(200034\)11:4<88::AID-CIR12>3.0.CO;2-8](https://doi.org/10.1002/1520-6386(200034)11:4<88::AID-CIR12>3.0.CO;2-8)
- Shaker, S. M., & Gembicki, M. P. (1999). *The WarRoom Guide to Competitive Intelligence* (1st ed.). McGraw-Hill Companies.
- Shamsastry, R. (2016). *Kautilya's Arthashastra*. Government Press, 1915.

- Short, J. C., Broberg, J. C., Coglisier, C. C., & Brigham, K. H. (2010). Construct validation using computer-aided text analysis (CATA): An illustration using entrepreneurial orientation. *Organizational Research Methods*, 13(2), 320–347. <https://doi.org/10.1177/1094428109335949>
- Sidak, V., Zakharov, A., & Zaplatynskiy, V. (2018). The Role of Competitive Intelligence in Ensuring the Economic Security of Enterprises. *Kosice Security Revue*, 8(2), 55–67.
- Sigalas, C., Pekka Economou, V., & B. Georgopoulos, N. (2013). Developing a Measure of Competitive Advantage. *Journal of Strategy and Management*, 6(4), 320–342. Scopus. <https://doi.org/10.1108/JSMA-03-2013-0015>
- Sims, J. E. (2022). *Decision Advantage: Intelligence in International Politics from the Spanish Armada to Cyberwar*. Oxford University Press.
- Singh, A., Fuld, L., & Beurschgens, A. (2008). A Roadmap for Ensuring Success. In *Starting a Competitive Intelligence Function* (pp. 263–276). Competitive Intelligence Foundation; SCIP.org. scip.org/cifoundation/
- Soilen, K. S. (2012). *Geoeconomics* (1st ed.). Bookboon.
- Soilen, K. S. (2015). A Place for Intelligence Studies as a Scientific Discipline. *Journal of Intelligence Studies in Business*, 5(3), 35–46. <https://doi.org/10.37380/jisib.v5i3.136>
- Soilen, K. S. (2016). A Research Agenda for Intelligence Studies in Business. *Journal of Intelligence Studies in Business*, 6(1), 21–36. <https://doi.org/10.37380/jisib.v6i1.151>
- Soilen, K. S. (2020). Labeling or science-by-buzzwords: The semantic trap in academic research and how to get out of it. *Journal of Intelligence Studies in Business*, 10(3), 4–7. <https://doi.org/10.37380/jisib.v10i3.635>
- Solis, B. (2010, November 3). The Dawn of the Social Consumer [Blog]. *Brian Solis*. <https://www.briansolis.com/2010/11/the-rise-of-the-social-consumer/>
- Spender, J.-C. (1996). Making Knowledge the Basis of a Dynamic Theory of the Firm. *Strategic Management Journal*, 17(S2), 45–62. <https://doi.org/10.1002/smj.4250171106>
- Stefanikova, L. (2014). The Need of Complex Competitive Intelligence. *ScienceDirect Contemporary Issues in Business, Management and Education*, 110, 669–677. <https://doi.org/10.1016/j.sbspro.2013.12.911>
- Stefanikova, L., Rypakova, M., & Moravcikova, K. (2015). The Impact of Competitive Intelligence on Sustainable Growth of the Enterprises. *Procedia Economics and Finance*, 26, 209–214. [https://doi.org/10.1016/S2212-5671\(15\)00816-3](https://doi.org/10.1016/S2212-5671(15)00816-3)
- Sterkenburg, P. van (Ed.). (2003). *A Practical Guide to Lexicography: Terminology and Lexicography Research and Practice 6* (Vol. 6). John Benjamins Publishing Company.
- Steyvers, M., Griffiths, T., Landauer, T., McNamara, D., Dennis, S., & Kintsch, W. (2007). Probabilistic Topic Models. In *Latent Semantic Analysis: A Road to Meaning* (7th ed., Vols 427–448, pp. 424–440).
- Stoyko, P. (2009). Defining Terms [Blog]. *SmithySmithy » Blog Archive*. <http://www.stoyko.net/smithysmithy/archives/35>
- Sturm, T., Gerlach, J., Pumplun, L., Mesbah, N., Peters, F., Tauchert, C., Nan, N., & Buxmann, P. (2021). Coordinating human and machine learning for effective organizational learning. *MIS Quarterly*, 45(3b), 1581–1602. <https://doi.org/10.25300/MISQ/2021/16543>

- Susanka, S., & Obolensky, K. (2009). *The Not so Big House: A Blueprint for the Way We Really Live* (Expanded Edition). The Taunton Press.
- Tahmasebifard, H. (2018). The Role of Competitive Intelligence and Its Sub-Types on Achieving Market Performance. *Cogent Business & Management*, 5(1), 1–16. <https://doi.org/10.1080/23311975.2018.1540073>
- Taleb, N. N. (2007). *The Black Swan: The Impact of the Highly Improbable* (Vol. 2). Random House, Inc.
- Tarek, B. H., Zouhayer, M., & Adel, G. (2017). Entrepreneurial Competitive Intelligence Between Uppsala Model and Born Global Theories in the Case of North African SMEs. *Journal of the Knowledge Economy*, 4(2), 1–22. <https://doi.org/10.1007/s13132-017-0489-6>
- Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13), 1319–1350. <https://doi.org/10.1002/smj.640>
- Teece, D. J. (2018). Business Ecosystem. In *The Palgrave Encyclopedia of Strategic Management* (pp. 1–4). Palgrave Macmillan UK. https://doi.org/10.1057/978-1-137-00772-8_724
- Tibshirani, R., Walther, G., & Hastie, T. (2001). Estimating the Number of Clusters in a Data Set Via the Gap Statistic. *Journal of the Royal Statistical Society*, 63(2), 411–423. <https://doi.org/10.1111/1467-9868.00293>
- Trim, P. (2001). A Framework for Establishing and Implementing Corporate Intelligence. *Strategic Change*, 10(6), 349–357. <https://doi.org/10.1002/jsc.550>
- Trochim, W. M., Donnelly, J. P., & Arora, K. (2016). *Research Methods: The Essential Knowledge Base* (2nd ed.). Cengage Learning.
- Tropotei, T. O. (2018). Criticism Against the Intelligence Cycle. *Scientific Research & Education in the Airforce*, 20, 77–88. <https://doi.org/10.19062/2247-3173.2018.20.9>
- Tyson, K. W. M. (1986). *Business intelligence: Putting it all together* (Vol. 1). Leading Edge Publications.
- Uschold, M., King, M., Moralee, S., & Zorgios, Y. (1998). The Enterprise Ontology. *The Knowledge Engineering Review*, 13(1), 31–89. <https://doi.org/10.1017/S0269888998001088>
- Vedder, R. G., & Guynes, C. S. (2001). A Study of Competitive Intelligence Practices in Organisations. *Journal of Computer Information Systems*, 41(2), 36–39. <https://doi.org/10.1080/08874417.2002.11646989>
- Vella, C. M., & McGonagle, J. J. (1987). *Competitive Intelligence in the Computer Age* (1st ed.). Greenwood Publishing Group Inc.
- Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the Qualitative-Quantitative Divide: Guidelines for Conducting Mixed Methods Research in Information Systems. *MIS Quarterly*, 37(1), 21–54. <https://doi.org/10.25300/MISQ/2013/37.1.02>
- Venkatesh, V., Brown, S. A., & Sullivan, Y. W. (2016). Guidelines for conducting mixed-methods research: An extension and illustration. *Journal of the Association for Information Systems*, 17(7), 435–495. <https://doi.org/10.17705/1jais.00433>
- Vicente, A., & Falkum, I. L. (2017). Polysemy. In *Oxford Research Encyclopedia of Linguistics* (p. 29). Oxford University Press. <https://doi.org/10.1093/acrefore/9780199384655.013.325>

- Viviers, W., Saayman, A., & Muller, M.-L. (2005). Enhancing a Competitive Intelligence Culture in South Africa. *International Journal of Social Economics*, 32(7), 576–589. <https://doi.org/10.1108/03068290510601117>
- Vroom, V. H., & Yetton, P. W. (1973). *Leadership and Decision-Making* (1st ed.). University of Pittsburgh Press.
- Wall, J. (1974). What competition is doing: Your need to know. *Harvard Business Review*, 52(6), 1–12.
- Walle, A. H. (1999). From Marketing Research to Competitive Intelligence: Useful Generalization or Loss of Focus? *Management Decision*, 37(6), 519–525. <https://doi.org/10.1108/00251749910278041>
- Walle, A. H. (2001). *Qualitative Research in Intelligence and Marketing: The New Strategic Convergence*. Greenwood Publishing Group.
- Wanderley, A. V. M. (1999). Um instrumento de macropolítica de informação. Concepção de um sistema de inteligência de negócios para gestão de investimentos de engenharia. *Ciência da informação*, 28(2), 190–199. <https://doi.org/10.1590/S0100-19651999000200011>
- Wang, C. H., & Borges, L. A. (2013). Does Competitive Intelligence Matter? An Anthropological Way of Thinking. *International Journal of Business Anthropology*, 4(2), 76–84. <https://doi.org/10.33423/ijba.v4i2.1152>
- Webster, J., & Watson, R. T. (2002). Analysing the Past to Prepare for the Future: Writing a Literature Review. *MIS Quarterly*, 26(2.3), xiii–xxiii.
- Weick, K. E. (1979). *The Social Psychology of Organizing* (2nd ed.). McGraw-Hill Humanities/Social Sciences/Languages.
- West, C. (2001). *Competitive Intelligence* (1st ed.). Springer.
- Wheaton, K. (2012). Let's kill the intelligence cycle. *Competitive Intelligence Magazine*, 15(2), 9–24.
- Wheaton, K. J., & Beerbower, M. T. (2006). Towards a New Definition of Intelligence. *Stanford Law & Policy Review*, 17(2), 319–330.
- Wickert, C., Post, C., Doh, J. P., Prescott, J. E., & Prencipe, A. (2020). Management research that makes a difference: Broadening the meaning of impact. *Journal of Management Studies*, 58(2), 297–320. <https://doi.org/10.1111/joms.12666>
- Wilensky, H. L. (1967). *Organizational Intelligence: Knowledge and Policy in Government and Industry* (Vol. 19). Basic Books, Inc.
- Wilkinson, A., & Kupers, R. (2013). Living in the futures. How scenario planning changed corporate strategy. *Harvard Business Review*, May, 2–11.
- Wirth, N. (2018). Hello Marketing, What Can Artificial Intelligence Help You With? *International Journal of Market Research*, 60(5), 435–438. Scopus. <https://doi.org/10.1177/1470785318776841>
- Wright, S., Bisson, C., & Duffy, A. P. (2013). Competitive Intelligence and Information Technology Adoption of SMEs in Turkey: Diagnosing Current Performance and Identifying Barriers. *Journal of Intelligence Studies in Business*, 2, 5–29. <https://doi.org/10.37380/jisib.v3i2.66>

- Wright, S., & Calof, J. (2006). The Quest for Competitive, Business and Marketing Intelligence. *European Journal of Marketing*, 40(5/6), 453–465. <https://doi.org/10.1108/03090560610657787>
- Xu, K., Liao, S. S., Li, J., & Song, Y. (2011). Mining Comparative Opinions from Customer Reviews for Competitive Intelligence. *Decision Support Systems*, 50(4), 743–754. <https://doi.org/10.1016/j.dss.2010.08.021>
- Yap, C. S., Cheng, B. L., Mohamad Hussain, N., & Ahmad, R. (2018). Innovativeness, Market Intelligence Practices, and Firm Performance of Small- and Medium-Sized Tour Operators. *Tourism & Hospitality Research*, 18(2), 143–151. <https://doi.org/10.1177/1467358416636931>
- Yap, C. S., & Rashid, M. Z. A. (2011). Competitive Intelligence Practices and Firm Performance. *Libri: International Journal of Libraries & Information Services*, 61(3), 175–189. <https://doi.org/10.1515/libr.2011.015>
- Yap, C. S., Rashid, M. Z. A., & Sapuan, D. A. (2013). Strategic Uncertainty and Firm Performance: The Mediating Role of Competitive Intelligence Practices. *Journal of Information & Knowledge Management*, 12(04), 1350028-1–14. <https://doi.org/10.1142/S0219649213500287>
- Yin, C.-Y. (2018). Measuring Organizational Impacts by Integrating Competitive Intelligence into Executive Information System. *Journal of Intelligent Manufacturing*, 29(3), 533–547. <https://doi.org/10.1007/s10845-015-1135-4>
- Zinkhan, G. M., & Gelb, B. D. (1985). Competitive Intelligence Practices of Industrial Marketers. *Industrial Marketing Management*, 14(4), 269–275. [https://doi.org/10.1016/0019-8501\(85\)90019-7](https://doi.org/10.1016/0019-8501(85)90019-7)
- Zinn, W., & Goldsby, T. J. (2014). Logistics Professional Identity: Strengthening the Discipline as Galaxies Collide. *Journal of Business Logistics*, 35(1), 23–28. <https://doi.org/10.1111/jbl.12038>
- Zlotnick, J. (1964). *National Intelligence* (1st ed.). Industrial College of the Armed Forces.

APPENDIX

APPENDIX 1: PRISMA CHECKLIST

Table 5.5 – PRISMA 2020 Checklist

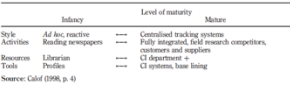
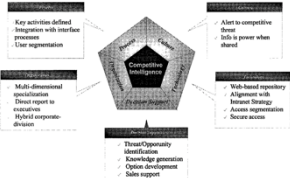
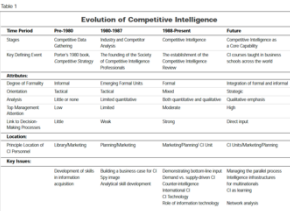
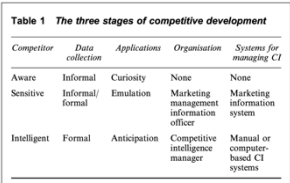
Section and Topic	Item #	Checklist item	Location where item is reported
Title			
Title	1	Identify the report as a systematic review.	Page 1, line 1
Abstract			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Page 1, lines 4-15
Introduction			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Page 1-2, lines 45-13
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Page 2, lines 14-23
Methods			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Page 2, line 32 - Table 1
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Page 2, line 32 - Table 1
Search strategy	7	Present the full search strategies for all databases, registers, and websites, including any filters and limits used.	Page 2, line 32 - Table 1
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and, if applicable, details of automation tools used in the process.	Page 2, line 32 - Table 1
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and, if applicable, details of automation tools used in the process.	Page 2, line 32 - Table 1
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g., for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Page 5, line 6 - Table 2
	10b	List and define all other variables for which data were sought (e.g., participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Page 5, line 6 - Table 2
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Page 2, line 32 - Table 1
Effect measures	12	Specify for each outcome the effect measure(s) (e.g., risk ratio, mean difference) used in the synthesis or presentation of results.	Page 6, line 27 - Table 3
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g., tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	Pages 6, lines 2-26

Section and Topic	Item #	Checklist item	Location where item is reported
Reporting bias assessment	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Page 6, lines 2-7
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Page 6, lines 8-10
	13d	Describe any methods used to synthesise results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Page 6, lines 2-7
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g., subgroup analysis, meta-regression).	Not applicable
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesised results.	Not applicable
	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	Not applicable
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	Page 6, lines 2-7
Results			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Page 4, lines 25-26 – Figure 2
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded and explain why they were excluded.	Page 4, lines 25-26 – Figure 2
Study characteristics	17	Cite each included study and present its characteristics.	Page 5, line 6 - Table 2
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	Page 6, line 27 - Table 3
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimates and its precision (e.g., confidence/credible interval), ideally using structured tables or plots.	Page 6, line 27 - Table 3
	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Page 6, lines 10-26
Results of syntheses	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g., confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Page 6, line 27 - Table 3
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	Not applicable
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesised results.	Not applicable
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	Not applicable
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	Page 6, lines 10-26
Discussion			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Pages 8, lines 3-6
	3b	Discuss any limitations of the evidence included in the review.	Pages 8, lines 7-16
	23c	Discuss any limitations of the review processes used.	Page 6, lines 10-26; Page 13, lines 13-19
	23d	Discuss implications of the results for practice, policy, and future research.	Pages 8-13, lines 8-10

Section and Topic	Item #	Checklist item	Location where item is reported
Other information			
	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Not registered
Registration and protocol	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Not prepared
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Not Applicable
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Page 19, lines 9-14
Competing interests	26	Declare any competing interests of review authors.	Page 14, lines 15-19
Availability of data, code, and other materials	27	Report which of the following are publicly available and where they can be found template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Pages 14-17, lines 21-24

APPENDIX 2: CIMMs FURTHER DETAILED CHARACTERISATION

Table 5.5 – Visualisation and Description of included CIMMs (developed by the authors)

Citation	CIMM Name	Visualisation	Description
(Calof, 1998)	Competitive Intelligence Quotient (CIQ)		CI is about skills development, process, and structural and cultural change. The CIQ is the maturity level resulting from advancing style, activities, resources, and tools from infancy to maturity/World Class CI (WCCI). Building a competitive organisation requires its leaders' clear commitment and involvement, usually taking at least five years of committed effort from senior management to create a WCCI capability. A CI competencies list (from SCIP) is offered to support the development of the practice.
(Marceau & Sawka, 1999)	World-Class CI Program in Telecoms (WCCIP-T)		The model presents five development planes as prerequisites and critical success factors to achieving a world-class CI: corporate culture (conducive to information sharing); straightforward interface (relationship and location of the CI within the organisation); relevance and extent of the CI portfolio of services; decision-making support (throughout the company); technical infrastructure (aggregation, organisation, and diffusion CI). The audience is the Telecom industry-leading global players, and critical stakeholders were the object of an interviews study for the development of the model.
(Prescott, 1999)	Action-Oriented CI Program (AOCIP)		This model is based on the analysis of the evolution of CI to identify its key dimensions and levels. The dimensions and aspects (ten) are based on identified main attributes and the Key Decision Areas from the Decision-Oriented Approach to Designing a CI Program. The latter is based on the 1997 study on CI best practices from APQC. The main objective is to improve the effectiveness of CI while presenting a business case for proposal management professionals. The model adds additional value by identifying key defining events and issues in the evolution of CI.
(West, 2001)	CI Stages of Development (CISoD)		The model assumes that organisations move through three stages of CI evolution across four dimensions: Data Collection, Applications, Organisation, and CI Systems. The model has three levels. First, Competitor Awareness - key competitors are known, some knowledge exists, the organisation rarely uses data for decision-making, and there is no CI Systems in place). Second, Competitor-sensitive - aware of competitive threats, relies exclusively on informal information flows, and there is still no structured intelligence program. Third, Competitor-intelligent - organisation anticipate competitive actions and events, dedicates serious resources, and has a specific location with the structure and systems to support the CI function. The model aims to understand the drivers and support the development of CI in Europe. The book offers further insight into the probability of using CI depending on the need for development capability and the ability to use it in practice.

Citation	CIMM Name	Visualisation	Description																																				
(APQC et al., 2004)	FIICH Model (FIICH)	<table><thead><tr><th>Prestart-up</th><th>Start-up</th><th>Established</th><th>World-Class</th></tr></thead><tbody><tr><td>Knowledgeable CI personnel</td><td>Demonstration project</td><td>Developed CI used as an interactive tool</td><td>Embedded CI culture</td></tr><tr><td>Determined role of CI</td><td>Network design plan</td><td>Project based CI</td><td>Outgoing based CI</td></tr><tr><td>Provisional plan</td><td>Awareness training</td><td>Established product line</td><td>Integration of strategic and tactical intelligence</td></tr><tr><td>Identifiable changes</td><td>Developing IT platform</td><td>Consistent application of CI analytical framework</td><td>Direct role on key issues</td></tr><tr><td>Preliminary administrative structure</td><td>All has requests dominate</td><td>Coordination of all CI activities throughout the company</td><td>Structures and modeling of competitive dynamics</td></tr><tr><td>Identifiable target of opportunity</td><td>NIU process to prioritize focus</td><td>Formalized evaluation process</td><td></td></tr><tr><td></td><td>Internal feedback</td><td>Network testing of local changes</td><td></td></tr><tr><td></td><td>CI code of ethics</td><td>Knowledgeable and mentoring CI users</td><td></td></tr></tbody></table> NOTE: Bold activities are essential to be in a particular stage of development; italicized activities represent transition points.	Prestart-up	Start-up	Established	World-Class	Knowledgeable CI personnel	Demonstration project	Developed CI used as an interactive tool	Embedded CI culture	Determined role of CI	Network design plan	Project based CI	Outgoing based CI	Provisional plan	Awareness training	Established product line	Integration of strategic and tactical intelligence	Identifiable changes	Developing IT platform	Consistent application of CI analytical framework	Direct role on key issues	Preliminary administrative structure	All has requests dominate	Coordination of all CI activities throughout the company	Structures and modeling of competitive dynamics	Identifiable target of opportunity	NIU process to prioritize focus	Formalized evaluation process			Internal feedback	Network testing of local changes			CI code of ethics	Knowledgeable and mentoring CI users		The development of a CI program (CIP) proceeds through four stages: prestart-up, start-up, established, and world-class. Each stage of development has an identifiable set of critical activities or indicators that allows a company to know its level and transition activities to the next stage of the CI program development. The model is based on the premise that CIPs can be characterised by their stage of development and that identified external and internal factors may cause reversals to earlier stages — if not the failure of the CIP – must be examined. The model offers a methodology to evolve across dimensions into more advanced stages: Focus (clear set of goals and objectives); Implement (organisational culture); Institutionalise (incorporate CI practices); Change (modify processes, behaviours, and performance); Hone (dynamic, evolving, continuously improving activity). This empirical study provides a comprehensive understanding of what it takes to have a successful CI functional unit. Based on years of research of leading-edge organisations – supported by examples of best practices and tips from actual practitioners — it intends to guide readers in their own CI efforts. The study also aims to influence the academic community in researching the role of an intelligence function in decision-making theory.
Prestart-up	Start-up	Established	World-Class																																				
Knowledgeable CI personnel	Demonstration project	Developed CI used as an interactive tool	Embedded CI culture																																				
Determined role of CI	Network design plan	Project based CI	Outgoing based CI																																				
Provisional plan	Awareness training	Established product line	Integration of strategic and tactical intelligence																																				
Identifiable changes	Developing IT platform	Consistent application of CI analytical framework	Direct role on key issues																																				
Preliminary administrative structure	All has requests dominate	Coordination of all CI activities throughout the company	Structures and modeling of competitive dynamics																																				
Identifiable target of opportunity	NIU process to prioritize focus	Formalized evaluation process																																					
	Internal feedback	Network testing of local changes																																					
	CI code of ethics	Knowledgeable and mentoring CI users																																					
(J. P. Herring & Leavitt, 2011)	CI Maturity Matrix (CIMMx)	<table><thead><tr><th>Themes</th><th>Ad-Hoc</th><th>Emerging</th><th>Defined</th><th>Institutional</th><th>Optimised</th></tr></thead><tbody><tr><td>Team</td><td>Individuals perform CI, occasionally along CI project in business units and shared services.</td><td>Individuals perform CI, occasionally along CI project in business units and shared services.</td><td>Individuals perform CI, occasionally along CI project in business units and shared services.</td><td>Individuals perform CI, occasionally along CI project in business units and shared services.</td><td>Individuals perform CI, occasionally along CI project in business units and shared services.</td></tr><tr><td>Tools</td><td>Some external commercial products in the enterprise.</td><td>Some external commercial products in the enterprise.</td><td>Some external commercial products in the enterprise.</td><td>Some external commercial products in the enterprise.</td><td>Some external commercial products in the enterprise.</td></tr><tr><td>Techniques</td><td>Secondary sources.</td><td>Primary and secondary sources.</td><td>Primary and secondary sources.</td><td>Primary and secondary sources.</td><td>Primary and secondary sources.</td></tr><tr><td>Processes</td><td>Data gathering.</td><td>CI Process defined and applied.</td><td>CI Process defined and applied.</td><td>CI Process defined and applied.</td><td>CI Process defined and applied.</td></tr><tr><td>Products</td><td>Handwritten, Ad hoc, memory, paper, printed, spreadsheets.</td><td>Handwritten, Ad hoc, memory, paper, printed, spreadsheets.</td><td>Handwritten, Ad hoc, memory, paper, printed, spreadsheets.</td><td>Handwritten, Ad hoc, memory, paper, printed, spreadsheets.</td><td>Handwritten, Ad hoc, memory, paper, printed, spreadsheets.</td></tr></tbody></table>	Themes	Ad-Hoc	Emerging	Defined	Institutional	Optimised	Team	Individuals perform CI, occasionally along CI project in business units and shared services.	Individuals perform CI, occasionally along CI project in business units and shared services.	Individuals perform CI, occasionally along CI project in business units and shared services.	Individuals perform CI, occasionally along CI project in business units and shared services.	Individuals perform CI, occasionally along CI project in business units and shared services.	Tools	Some external commercial products in the enterprise.	Some external commercial products in the enterprise.	Some external commercial products in the enterprise.	Some external commercial products in the enterprise.	Some external commercial products in the enterprise.	Techniques	Secondary sources.	Primary and secondary sources.	Primary and secondary sources.	Primary and secondary sources.	Primary and secondary sources.	Processes	Data gathering.	CI Process defined and applied.	CI Process defined and applied.	CI Process defined and applied.	CI Process defined and applied.	Products	Handwritten, Ad hoc, memory, paper, printed, spreadsheets.	Handwritten, Ad hoc, memory, paper, printed, spreadsheets.	Handwritten, Ad hoc, memory, paper, printed, spreadsheets.	Handwritten, Ad hoc, memory, paper, printed, spreadsheets.	Handwritten, Ad hoc, memory, paper, printed, spreadsheets.	The matrix is based on a six-month study of the core of the entire value chain processes to optimise the CI of the enterprise. A later benchmark in best practices determined that it was ineffective to continue to be ‘everything to all people.’ Consequently, the group reassessed its ion and audience and focused primarily on providing CI to support enterprise-wide strategic decisions and research new market potential. As a result, the author developed the CI Maturity Matrix in early 2006 to serve as a roadmap to achieve a CI process that provided more value to the enterprise. The matrix is five stages per five dimensions description of best practices to develop mature CI practices.
Themes	Ad-Hoc	Emerging	Defined	Institutional	Optimised																																		
Team	Individuals perform CI, occasionally along CI project in business units and shared services.	Individuals perform CI, occasionally along CI project in business units and shared services.	Individuals perform CI, occasionally along CI project in business units and shared services.	Individuals perform CI, occasionally along CI project in business units and shared services.	Individuals perform CI, occasionally along CI project in business units and shared services.																																		
Tools	Some external commercial products in the enterprise.	Some external commercial products in the enterprise.	Some external commercial products in the enterprise.	Some external commercial products in the enterprise.	Some external commercial products in the enterprise.																																		
Techniques	Secondary sources.	Primary and secondary sources.	Primary and secondary sources.	Primary and secondary sources.	Primary and secondary sources.																																		
Processes	Data gathering.	CI Process defined and applied.	CI Process defined and applied.	CI Process defined and applied.	CI Process defined and applied.																																		
Products	Handwritten, Ad hoc, memory, paper, printed, spreadsheets.	Handwritten, Ad hoc, memory, paper, printed, spreadsheets.	Handwritten, Ad hoc, memory, paper, printed, spreadsheets.	Handwritten, Ad hoc, memory, paper, printed, spreadsheets.	Handwritten, Ad hoc, memory, paper, printed, spreadsheets.																																		
(Comai & Prescott, 2007)	World Class CI (WCCI)		The structure of the WCCI model identified nine dimensions subdivided into 48 aspects. The authors prepared a statement describing what the judges believe to be a world-class performance for each dimension and its accompanying aspects. The modes were defined so that their statements apply regardless of how the CI function is organised in the Strategic Business Unit (SBU). The authors defined "world-class" not as "the best that currently exists" but as "the ultimate best that might be achieved". The nine dimensions are: 1) Strategic Significance (recognised importance of CI defining the scope and level of CI activities); 2) CI in the Organisational Structure (clear operational vision between CI & the SBU); 3) CI Culture (organisational culture allows CI contribution to be maximised); 4) & 5) People and Physical resources (necessary for CI effective functioning); 6) CI Process (clearly defined and well established for gathering, validating, analysing, and storing CI); 7) CI project management (systems in place for selecting and prioritising CI projects); 8) Management Control (clear processes in place for top-level management control of CI operations); 9) Evolution Of The CI Unit (clearly defined evolutionary strategy for how the CI vision is to be achieved). The measurement scale to identify the development level is 1) We have not started this yet. 2) We have made some progress but still have a long way to go; 3) We have achieved a lot but still have a lot to do. 4) We have nearly achieved this but still have some work to do;																																				

Citation	CIMM Name	Visualisation	Description																																																
(Singh et al., 2008)	Roadmap for Enduring CI Success (RECIS)	<table><thead><tr><th>Attributes</th><th>Stages</th><th>Predictor</th><th>World Class</th></tr></thead><tbody><tr><td>1. Rules and responsibilities</td><td>Undefined rules, unclear responsibilities, no common language</td><td>Defined rules and responsibilities, common language, CI team and executive management aware</td><td>Agreed on rules, trust, agreement between the CI team and executive management team</td></tr><tr><td>2. Processes</td><td>Top-down, one-way chain of command</td><td>Introduction to KPIs, aligned to a wider executive management audience</td><td>CI embedded in such a manner that intelligence becomes a part of all major decisions</td></tr><tr><td>3. Secondary research</td><td>Weak in the early years of intelligence</td><td>Expanding and trying additional external sources</td><td>Fully integrated use of internal and external electronic and grey literature sources</td></tr><tr><td>4. Primary research</td><td>NI</td><td>Recognize the value of human sources that have not been fully exploited</td><td>Fully integrated use of internal and external human sources</td></tr><tr><td>5. Analysis</td><td>NI</td><td>Operational use of basic analytical tools</td><td>Selection and use of advanced analytical tools</td></tr><tr><td>6. People</td><td>One formal CI staff, "information" personnel</td><td>Individuals concerned by common</td><td>Experienced CI practitioners</td></tr><tr><td>7. Organizational structure</td><td>CI absent from the organizational chart</td><td>CI functions are not integrated in the corporate hierarchy</td><td>CI function is placed within multiple parts of the organization</td></tr><tr><td>8. CI awareness</td><td>Central to a handful of individuals and slowly gaining visibility</td><td>Increased awareness is required for a "Real Factor" in the organization</td><td>CI embedded in all decisions, performance, programs and training</td></tr><tr><td>9. Technology</td><td>Over-reliance on desktop Internet searching</td><td>Recognition that technology is not a substitute for the intelligence that is required</td><td>Fully developed intelligence capabilities, human systems</td></tr><tr><td>10. Value perception</td><td>Limited in the organization</td><td>Clear value to the organization that CI is necessary</td><td>CI function is seen as a key component of the organization's success</td></tr><tr><td>11. CI professionalization</td><td>NI</td><td>Individuals and professional development</td><td>Management plan for CI team career progression</td></tr></tbody></table>	Attributes	Stages	Predictor	World Class	1. Rules and responsibilities	Undefined rules, unclear responsibilities, no common language	Defined rules and responsibilities, common language, CI team and executive management aware	Agreed on rules, trust, agreement between the CI team and executive management team	2. Processes	Top-down, one-way chain of command	Introduction to KPIs, aligned to a wider executive management audience	CI embedded in such a manner that intelligence becomes a part of all major decisions	3. Secondary research	Weak in the early years of intelligence	Expanding and trying additional external sources	Fully integrated use of internal and external electronic and grey literature sources	4. Primary research	NI	Recognize the value of human sources that have not been fully exploited	Fully integrated use of internal and external human sources	5. Analysis	NI	Operational use of basic analytical tools	Selection and use of advanced analytical tools	6. People	One formal CI staff, "information" personnel	Individuals concerned by common	Experienced CI practitioners	7. Organizational structure	CI absent from the organizational chart	CI functions are not integrated in the corporate hierarchy	CI function is placed within multiple parts of the organization	8. CI awareness	Central to a handful of individuals and slowly gaining visibility	Increased awareness is required for a "Real Factor" in the organization	CI embedded in all decisions, performance, programs and training	9. Technology	Over-reliance on desktop Internet searching	Recognition that technology is not a substitute for the intelligence that is required	Fully developed intelligence capabilities, human systems	10. Value perception	Limited in the organization	Clear value to the organization that CI is necessary	CI function is seen as a key component of the organization's success	11. CI professionalization	NI	Individuals and professional development	Management plan for CI team career progression	5) We have fully achieved this. The study aims to answer four research questions: What are the dimensions? What are the main dimensions? What are the milestones and relationships between them? What are the best ways to achieve WCCI? The RECIS results from the evolution of two reports and a study to ensure the success of CI activities in an organisation. The Self-Diagnostic Framework (SDF) (Singh & Beurschgens, 2006) provides value by describing the current stage of your program's development per attribute (dimension). The column with the most checks is where the organisation is in terms of CI development level (stage). This tool is a starting point to begin the analysis of the CI capabilities of an organisation by determining at which level it is and defining how it can be improved. The survey and white paper from Fuld & Singh (2007) explored the critical success factors of CI Programs (CIPs) across the globe. Using the exact eleven dimensions and "Four Intelligence Stages" from the SDF, it developed a more scientific and more profound assessment of the state of the CI discipline. A roadmap emerged from the two-year study where 141 worldwide companies examined and assessed their intelligence efforts (Fuld & Singh, 2007). Capability attributes are the key building blocks to developing a fully operational intelligence and competent CI function capability. The phases of development are the milestones for developing your function. The aim is to accelerate CI improvement as an individual, a team, or a function. NOTE: This study was based on a self-assessment test submitted via a web survey. Fuld & Company did not interview or audit each respondent after submitting the survey.
Attributes	Stages	Predictor	World Class																																																
1. Rules and responsibilities	Undefined rules, unclear responsibilities, no common language	Defined rules and responsibilities, common language, CI team and executive management aware	Agreed on rules, trust, agreement between the CI team and executive management team																																																
2. Processes	Top-down, one-way chain of command	Introduction to KPIs, aligned to a wider executive management audience	CI embedded in such a manner that intelligence becomes a part of all major decisions																																																
3. Secondary research	Weak in the early years of intelligence	Expanding and trying additional external sources	Fully integrated use of internal and external electronic and grey literature sources																																																
4. Primary research	NI	Recognize the value of human sources that have not been fully exploited	Fully integrated use of internal and external human sources																																																
5. Analysis	NI	Operational use of basic analytical tools	Selection and use of advanced analytical tools																																																
6. People	One formal CI staff, "information" personnel	Individuals concerned by common	Experienced CI practitioners																																																
7. Organizational structure	CI absent from the organizational chart	CI functions are not integrated in the corporate hierarchy	CI function is placed within multiple parts of the organization																																																
8. CI awareness	Central to a handful of individuals and slowly gaining visibility	Increased awareness is required for a "Real Factor" in the organization	CI embedded in all decisions, performance, programs and training																																																
9. Technology	Over-reliance on desktop Internet searching	Recognition that technology is not a substitute for the intelligence that is required	Fully developed intelligence capabilities, human systems																																																
10. Value perception	Limited in the organization	Clear value to the organization that CI is necessary	CI function is seen as a key component of the organization's success																																																
11. CI professionalization	NI	Individuals and professional development	Management plan for CI team career progression																																																
(Heppes & Du Toit, 2009)	CI Function Maturity Level (CIFML)	<table><thead><tr><th>Sub-category</th><th>Category</th><th>Sub-category</th><th>Category</th><th>Sub-category</th><th>Category</th></tr></thead><tbody><tr><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td></tr><tr><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td></tr><tr><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td></tr><tr><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td></tr><tr><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td></tr></tbody></table>	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Heppes identified the typical evolution of a world-class CI capability typically as spanning three significant stages; 1) Early-stage (providing facts and creating CI awareness less than 1,5 years of operation); 2) Mid-level capability (identifying trends and implications from gathered data, within an emerging partnership with CI users operational between 1,5 - 3 years); 3) World-class (CI regarded as a key component of company strategy more than three operating years). These stages evolve across seven dimensions: 1) CI Function (CIF) deliverables and capabilities; 2) analytical products; 3) Relationship with management; 4) staffing of CI function; 5) CI skills; 6) sources of information. The overall aim is to establish the level of maturity of the CI function. This study focused on identifying the maturity level of CI for a South African retail bank.												
Sub-category	Category	Sub-category	Category	Sub-category	Category																																														
Sub-category	Category	Sub-category	Category	Sub-category	Category																																														
Sub-category	Category	Sub-category	Category	Sub-category	Category																																														
Sub-category	Category	Sub-category	Category	Sub-category	Category																																														
Sub-category	Category	Sub-category	Category	Sub-category	Category																																														
Sub-category	Category	Sub-category	Category	Sub-category	Category																																														
(J. P. Herring & Leavitt, 2011)	World-Class CI Program Roadmap (WCCIPR)	<table><thead><tr><th>Category</th><th>Sub-category</th><th>Category</th><th>Sub-category</th><th>Category</th><th>Sub-category</th></tr></thead><tbody><tr><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td></tr><tr><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td></tr><tr><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td></tr><tr><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td></tr><tr><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td><td>Category</td><td>Sub-category</td></tr></tbody></table>	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	Category	Sub-category	The roadmap shows where the CI Program (CIP) is now, the vision of where the organisation wants it to be, and the steps needed to get there. The roadmap organises a CIP in three-time stages: 1) developmental (first 1-2 years), 2) professionalisation (3-5 years), and 3) optimisation (6+ years). The Developmental Stage is critical to building a world-class professional program (WCCIP) from the onset. All dimensions must be identified and put in place over the first two years to develop a strong foundation. The Professionalisation Stage requires formidable effort to enhance the collection and analysis methods while advancing intelligence policies and procedures requires experienced intelligence expertise. Once these essential functions and processes are established, the next set of tasks is to professionalise those operations and the												
Category	Sub-category	Category	Sub-category	Category	Sub-category																																														
Category	Sub-category	Category	Sub-category	Category	Sub-category																																														
Category	Sub-category	Category	Sub-category	Category	Sub-category																																														
Category	Sub-category	Category	Sub-category	Category	Sub-category																																														
Category	Sub-category	Category	Sub-category	Category	Sub-category																																														
Category	Sub-category	Category	Sub-category	Category	Sub-category																																														

Citation	CIMM Name	Visualisation	Description
			individuals who produce and apply the intelligence. The Optimisation Stage is the final stage in becoming a WCCIP. The real challenge is to maintain the level of organisational performance for years afterwards. The SCIP-IRI study found that the average age of world-class programs was about eight years. The vertical axis contains the four functional dimensions that form the core of all CI programs: 1) users and uses; 2) people and their professional development; 3) sources and methods; 4) the policies, processes, and procedures that bring the program altogether and ensure it runs smoothly. Following is a descriptive discussion of the twelve boxes on the Herring-Leavitt World-Class CI Program Roadmap. The choice of a roadmap framework for the WCCI model shows the evolution of the world-class process over time and, most significantly, promotes organisational learning.

(Hedin et al., 2014)

World Class MI Roadmap (WCMIR)

Level KSF	1. Informal	2. Basic	3. Intermediate	4. Advanced	5. World Class
Process	Executive ad hoc projects. Uncoordinated information purchases.	Small entities with isolated information resources. Little or no process.	Primary information collection. Coordinated action with limited scope.	Complete market scanning. Advanced analysis. Regional scope in key people.	Integrated into key business processes. Applied to key business issues. Universal analysis. Early warning.
Organization	No dedicated resources. Uncoordinated activities.	One person responsible. Increased resources. Increased process with business units.	Full time entity position. Coordinated activities. Basic analysis.	Research with additional resources in R&D. Changing focus. Access to localized primary information.	Integration of internal and external efforts. Oriented on key business issues. Learning group.
Scope	No focus. Ad hoc needs driven.	Linked with specific business units. Developing relationships.	General. Company-wide. Cross-functional.	In-depth. Specific. Sales to new markets. B2B and B2C.	Focus oriented. Focus outside sales. Sales B2B and B2C.
Culture	No understanding of CI. No awareness of CI.	Some awareness. One-way communication.	Higher awareness. Shared vision. CI as a corporate strategy.	Increased awareness. CI as a corporate strategy. Engagement and support.	Comprehensive support. CI as a corporate strategy. CI as a support.
Tools	Basic. Manual. No CI.	Computer. Manual. No CI.	Computer. Manual. No CI.	Computer. Manual. No CI.	Computer. Manual. No CI.
Deliverables	Ad hoc.	Ad hoc.	Ad hoc.	Ad hoc.	Ad hoc.

The World Class Market Intelligence Roadmap (WCMIR) incorporates intelligence development into an evolutionary process. The authors identified five levels of growth from the start to the world-class level and six key success factors (KSF) that move the program through those growth levels. The role of the CI manager is different for each of the five levels of the intelligence evolution roadmap. The same applies to all six Key Success Factors (KSF): the further the program advances through the various levels, the more sophisticated process it needs. Combining the six KSFs with the five stages creates a 30-box matrix. Each box describes a KSF relevant to each of the development steps. To grow the CI function, organisations need to implement the appropriate measures. Reviewing the development roadmap, one can identify the present status and what is necessary to move CI up a level. The roadmap can also help determine the CI function's future objectives. Over time, most CI functions should reach the intermediate level, where the basic intelligence processes are in place. However, several specific issues arise at that level and must be addressed before the organisation can move toward the advanced and world-class levels. The framework is based on research conducted during 2005- 2008 with 700 companies, and their input has been used to verify the roadmap concept. In addition, many companies have empirically tested the concept.

(Oubrich et al., 2018)

Competitive Intelligence Maturity Model (CIMM-M)

CI dimension	Early stage CI	Mid-level CI capability	World-class CI capability
CI Strategy and Culture	The competition in the environment is not defined. CI practices are only about internal scanning. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.	The competition in the business environment is not defined. CI practices are about internal scanning and external scanning. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.	The competition in the business environment is not defined. CI practices are about internal scanning, external scanning, and external scanning. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.
CI Infrastructure and Management	CI is not used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.	CI is used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.	CI is used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.
CI Resources	CI is not used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.	CI is used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.	CI is used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.
CI Processes	CI is not used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.	CI is used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.	CI is used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.
CI Deliverables and CI Cycle	CI is not used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.	CI is used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.	CI is used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.
CI Impact	CI is not used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.	CI is used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.	CI is used by top management. The role of CI is unclear. The role of CI is unclear. The role of CI is unclear.

The maturity model proposed is based on a comprehensive review of recent literature. The objectives of this study are threefold: 1) determine the significant purposes of a CIMM, 2) identify the CI dimensions and levels of maturity, and 3) evaluate Moroccan CI practices. The conceptual framework articulates the CI dimensions and three maturity levels. The six CI dimensions are CI Culture; CI deliverables; CI sourcing; CI cycle; CI investment in resources; CI users; and CI application). Implementing these dimensions determines the position across three levels: early, mid, and world-class. The model was tested through an empirical study conducted in the Moroccan context. The results show that most Moroccan companies are in the early stage of CI, using environment scanning in a not-so-intense competitive environment allowing for the absence of a CI structure. However, most of these Moroccan companies are not able to cope with changes in the business environment as CI systems and processes are implemented on an irregular basis.

Citation	CIMM Name	Visualisation	Description
(M-Brain et al., 2019)	M-Brain - World-Class Intelligence Framework (WCIF)		M-Brain's Intelligence Framework (M-BIF) expands the Hedin et al. WCMIR to help organisations achieve three benefits: better and faster decisions, time and cost savings, and organisational learning and new ideas. This is achieved by a systematic strategic market and competitive intelligence operation. Results are measured against and plotted on the matrix of nine Key Success Factors of an intelligence organisation (KSF) against five increasing levels of CI professionalism. The M-BIF framework distinguishes five maturity levels from Level 1 - beginners or "firefighters" - to the most advanced Level 5, the "futurists" and World Class intelligence organisations. The supporting survey gives the international CI community a good picture of the global average and world-class intelligence functions. In addition, the results offer in-depth information about the size of intelligence teams, their place within the organisation, available budget, number of stakeholders and contributors to intelligence (for co-creation) and much more. In concrete terms, the survey results are used by many companies to benchmark, set aspirational goals and develop roadmaps with implementation plans.
(Alvares et al., 2020)	Organisational Intelligence Maturity Model (OIMM)		The Organisational Intelligence Maturity Model (OIMM) presents the condition of dependence between information management (IM), knowledge management (KM), and CI to demonstrate that IM and KM are associated with the CI maturity level. The results from exploratory qualitative research based on a literature review show that IM is the foundation for KM, which, in its turn, supports and enables CI. This confirms that the maturity level as a series of one-dimensional linear stages is also applicable to the organisational intelligence expanded model. The result is a matrix of 2 categories and 17 dimensions across the three stages (IM, KM, and CI) and six levels (Non-Managed/Individual, Structuring/Group, Formative/Integration, Effective/Creation, Analytical/Network, and Proactive/Full). The study aims to explain business development relative to the progression from IM to KM and CI maturity levels to understand, implement, improve, benchmark or self-assess IM, KM, or CI models.



NOVA Information Management School
Instituto Superior de Estatística e Gestão de Informação

Universidade Nova de Lisboa