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EDITOR'S NOTE **VOL 9, NO 3 (2019)**

Stevan Dedijer
1911-2004

The argument that "there is nothing new in the competitive intelligence field"

It is often heard, and even more often seen written, for example on social media, that that there is nothing new in the competitive intelligence (CI) field. There are no new ideas, the ideas that are being expressed are the same old, there is no development, there is, at best, stagnation. Even the old claim that CI is dead[1] reappears with a certain frequency[2]:

> "Competitive intelligence as a profession is dead. There are fewer and fewer full-time, dedicated CI professionals in organizations, and even fewer legitimate CI departments or functions. The need to understand an organization's competitors has been diffused to several other functions including market research, finance, sales, R&D and others. What the founders of the profession - Jan Herring, Leonard Fuld, and Ben Gilad - built through the 80s and 90s no longer exists. And organizations are the worse off for it"[3].

Is this true? Yes and No. From a research perspective CI has developed and emerged with information technology (IT) solutions over the past ten years. It has come to the point where it does not make much sense to talk about new CI practices. Most advancements and developments are now about IT solutions and applications. This has again given rise to a whole new world of intelligence related problems and opportunities, not only for engineers but for users of these technologies. It is probably fair to say that the intelligence perspective has never been as important for businesses as it is today. Companies and organizations have never collected and analyzed as much information.

Another way to explain this development is to say that CI has evolved, thus is no longer the same. Trying to look for the same or insisting that it has not changed gives the impression that there is nothing new in CI. CI consists of an interesting body of literature, but it was not the first term to deal with questions of intelligence in private organizations, and it is not the last. Before CI there was social intelligence, strategic intelligence and corporate intelligence with their own consultants and literature. As Sawka rightly points out CI was a label used in the 80s and 90s. Other terms used include market intelligence, marketing intelligence, business intelligence, collective intelligence, financial intelligence, scientific and technical intelligence, foresight, insight, and equivalent terms in other languages, like "l'information stratégique et de la sécurité économiques" (Sisse) [previously "intelligence économique"], "veille" in French and "omvärldsanalys" in Swedish. All these fields, where a field is defined as a body of literature, basically study the same phenomenon, how to gather information to make better decisions. As such intelligence studies is a part of the information age. The information age gave birth to several bodies of literature, of which the more established include information systems, management information systems and customer relations management. The intelligence perspective never really caught on among business scholars, maybe because it was associated with industrial espionage. The intelligence parallel in business is also a bet, the argument that private organizations are better organized as intelligence organizations, much like in state and/or military organizations. The idea is that this will give better information, which again will lead to a competitive advantage. So far, this bet has not caught on. Business organizations continue to be organized much as they were a hundred years ago: into production, sales,

[1] Sawka, Kenneth. (2010). The death of the competitive intelligence professional. *Outward Insights*, *13*(2), 36-39.
[2] Sawka, Kenneth. The death of the competitive intelligence professional. Retrieved January 30, 2020 from https://www.linkedin.com/feed/update/urn:li:activity:6627549366062194688
[3] Idem

marketing, HR, finance and accounting. However, the way people work in all of these departments with ever larger amounts of information and data is starting to look more like intelligence operatives with their extensive system of files. In other words, the CI position never really saw a breakthrough, but CI has become an ever more important part of employees' jobs, as a function.

How can we then explain the frequently raised discussion related to the problems of CI? Let me suggest two answers, one general, the other more specific. Once we create something, we insist that it has either to exist, as it is, or it must disappear, thus at the end it is declared dead. This is the western mind at work, thinking in dichotomies, a thing either exist or it does not exist. There is no room for evolution, only constants. If a phenomenon such as a discipline evolves, we shouldn't say that it's dead, it just isn't the same anymore, and nothing is more natural than that. So, what must change is rather the way in which we think about the fields we study. The other suggestion is that the critic of CI has more to do with another problem, the selling of consulting services. The market for consultancy services is highly segmented and fiercely competitive. As consultants we are trying to make a name for ourselves in a niche we can call our own and strive to be an acknowledged expert in it. This takes years, often a whole career. Academic careers are created much according to the same logic so the problem is the same there. The underlying message is "this is my area", my niche, and as such I will defend it. What often happens is that another persons' or group's area grows into our own and sometimes is better at explaining the reality of our business problem, thus challenging our very raison d'être. Instead we insist that we are still relevant refusing to read up on other areas. We cease to be curious and the very business problems we study pass on to others. Some would argue this is what happened to CI.

So, where is CI today? There certainly are many answers to this question. One suggestion is that it is more often treated as business intelligence again (it very much started there, but then without the IT association), data mining, search engine optimization, social media marketing and digital marketing in general. It suffices to look at the articles in this issue to find other examples: Bleoju et al. write about how MOOCs can be used to teach intelligence. Sperkova writes about customer experience (CX) and voice of customer (VoC). Poblano-Ojinaga et al. write about structural equation modeling for the identification of the intelligence factors. All authors have that in common that the are studying how organizations handle intelligence.

In more detail, the first article by Bleoju et al. entitled "Empirical evidence from a connectivist competitive intelligence massive open online course (CI cMOOC) proof of concept" reveals how "the CI learning community perceives the capability of a cMOOC to train foreknowledge practices, given the best match between its content and context." The paper argues for "an open intelligence approach to cMOOC collective training."

The second article by Maune entitled "Competitive intelligence as a game changer for Africa's competitiveness in the global economy" develops a conceptual framework for how competitive intelligence can be adopted by African countries to improve their performance in the global economy.

The third article by Sperkova entitled "Integration of textual VoC into a CX data model for business intelligence use in B2C" is a summary of her PhD, which will be defended in February 2020 at the University of Economics in Prague, the Department of Information Technologies. The author presents a model to store the customer experience (CX) and voice of customer (VoC) data as part of a business intelligence system. The model can help to improve customer relationships and make future performance more automatic and effective.

The fourth article by Palilingan and Batmetan Entitled "How competitive intelligence can be used to improve a management vocational high school: A case from Indonesia" shows how competitive intelligence can be applied to make a vocational high school more efficient.

The fifth and last article by Poblano-Ojinaga et al. entitled "Effect of the competitive intelligence on the innovation capability: an exploratory study in Mexican companies", is an investigation using a methodology of structural equation modeling for the identification of the intelligence factors, to evaluate their relative importance and relationships with the innovation capability of Mexican companies. The empirical results show that the relationship between competitive intelligence and the innovation capability is indirect, with knowledge management as a mediating factor.

Some news worth mentioning: we would like to thank the Swedish Research Council/ NOP-HS for receiving the "large" grant for Open Access journals for two years starting in 2020. JISIB is now indexed by Crossref, which should give users direct access to PDF full text through databases like Scopus and Web of Science. The SCIP organization, owned by Frost & Sullivan, has been reignited with a new executive director. We wish them good luck. There are numerous conferences on intelligence related topics this spring and next winter. See the JISIB website for details. Some of the editors of JISIB will be at the ICI in Bad Nauheim 11-14 May 2020. We hope to see you there.

As always, we would above all like to thank the authors for their contributions to this issue of JISIB. Thanks to Dr. Allison Perrigo for reviewing English grammar and helping with layout design for all articles.

On behalf of the Editorial Board,

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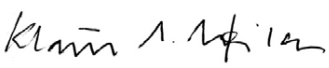

Prof. Dr. Klaus Solberg Søilen
Halmstad University, Sweden
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Empirical evidence from a connectivist Competitive Intelligence Massive Open Online Course (CI cMOOC) proof of concept

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ABSTRACT This study proposes a competitive intelligence connectivist Massive Open Online Course (CI cMOOC) proof of concept and highlights the interactions among content, context and community to explore relevance in CI cMOOC behavior. The CI cMOOC proof of concept was empirically tested with an online purposive sampling to target a qualified audience of similar and dissimilar information-rich cases, providing evidence about content-context-community competing influence on CI knowledge. The results revealed how the CI learning community perceive the capability of a cMOOC to train foreknowledge practices, given the best match between its content and context. The findings outline that tailored learning approach of the instructor influences the CI learning community's satisfaction with the content. The study facilitates theory development in addressing the emerging paradigm of an open intelligence approach to cMOOC collective training. Within boundaries of empirical return on experience of qualified respondents, the research framework strengthens trust in supervised interpretive judgment of CI learners confronted with anticipating competitive challenges.

KEYWORDS Collective training, competitive intelligence, connectivist MOOC, decisional practice, self-regulated learning behavior

1. INTRODUCTION

The key role of interactions in the learning process has always posed a challenge for competitive intelligence (CI) training programs. This paper builds upon a proof of concept related to a connectivist Massive Open Online Courses (MOOC), tailored to the philosophy of connectivism and networking (Daniel, 2012). A connectivist MOOC design enhances learners' networking skills and enables learning gains in terms of autonomy and interactivity across distributed environments (Mackness et al., 2013). Connectivist Massive Open Online Courses (cMOOCs) are innovative learning environments that are capable of scaling learner interactions because they are designed to capture collaborative learning opportunities (Joksimović et al., 2018).

Grounded in rich literature and practice, the focal issue of CI should unlock its substantial influence on decision making by increasing collective exposure to reflective judgments about challenging outcomes. As a domain of expertise, CI fails to persuade decision makers to capitalize on its intangible value in mapping the strategic needs of businesses. Balancing pragmatism and training curiosity with conditioned mindsets,

CI should guide strategic choices in deploying learning with future roadmaps, acting as collaborative platforms to train foreknowledge decisional practices. What differentiates competitors is not the strategic information and the way they capture and control it, but rather the way in which the decision is made, especially in terms of the decision-making time. In this context, actionable knowledge of CI delivered within the cMOOC environment enhances competitive responses.

Our involvement in CI research over the last 10 years leads us to speculate whether knowledge on this topic is transferable to interested learners through a cMOOC. This study highlights online community members' perceptions of the process of sharing CI expertise and knowledge. This process is moderated by a new cMOOC conceptualization that provides the basis for interactions between learners who are eager to upgrade their CI knowledge. The goal of this study is to test the CI cMOOC framework to assess its validity as a learning device that addresses both learners' CI skill acquisition demands and pertinent doubts within the community of expertise. The CI cMOOC proof of concept is an explicit attempt to match context-over-content and context-over-community concerns by enabling access to the CI knowledge base while calibrating the pertinence of opportunity-driven CI skills.

As the cMOOC establishes rules to structure elusive CI knowledge, the 3Cs approach (context, content, and community) reframes the active learning landscape of training foreknowledge decisional practices. The proposal of the 3Cs approach to CI cMOOCs resulted from careful consideration of other triple helix analogies. One example is the entrepreneurial university, which is involved in socioeconomic development as well as the traditional missions of teaching and research (Etzkowitz, 2010). Another example is the triple helix system of innovation (Ranga and Etzkowitz, 2013), which consists of R&D and non-R&D innovators, "single-sphere" and "multi-sphere" (hybrid) institutions, and individual and institutional innovators. A third example is the triple helix of knowledge (Bratianu, 2015), which is based on the interrelations between emotional, spiritual, and cognitive knowledge.

The context of the CI cMOOC is crucial because of the limited transferability of CI knowledge. This limited transferability owes to the firm-specific CI process-based identity and its recognizable value as a performance differentiator in real markets. The CI cMOOC content must purposefully match conflicting interests and conflicting objectives of CI capabilities, which are expected to distinctively position players in competitive markets based on the capitalization of actionable knowledge. Finally, structuring the active learning constructs is based on multiple causal links in setting learning objectives and sharing best practices of collaborative sense making within the CI cMOOC community.

In response to decision-making difficulties in stretching strategic vision needs, collaborative training connectivity enables interpretive judgment, highlights the sharing of knowledge about mapping driving and restraining forces, and enhances learners' gains in overcoming concerns over delivering CI skills in real businesses. The 3Cs approach, coupled with concerns over the limited transferability of CI skills to strategic decisions, highlights the need to calibrate a connective CI learning landscape. Acknowledging the complexity of the interrelated disruptive research ambition and specific objectives, this study builds on pertinent team expertise in mixed research methods and managerial practice.

The primary challenge of the CI cMOOC is to address the paradigm shift from the dominant content-based logic to a context-based logic of acquiring and sharing CI knowledge. Beyond the proof of concept, the estimated impact of the CI cMOOC model of active skills transfer is positively moderated by methods of acquiring skills.

The remainder of this paper is organized as follows: Section 2 introduces the relevant theory; Section 3 outlines the research framework, methods, and study procedure; Section 4 presents the findings and their theoretical and practical implications; Section 5 concludes.

2. THEORETICAL BACKGROUND

The broadly accepted definition of CI is the process of gathering and analyzing raw data related to competitors' strategic movements (i.e., CI process inputs) and transforming these data into valuable knowledge (i.e., support for better decisions on market positioning) (Fuld, 1995; Kahaner, 1996; McGonagle and Vella, 2002). Active learning is based on the idea that learners construct their own versions of reality rather than simply accepting the versions that are presented by their instructors (Prince and

Felder, 2006). Given the variety and interactivity of the active learning experiences that are available in most cMOOCs (Bruff et al., 2013), the use of a CI cMOOC within an open community of learners involves design questions that have not been raised in textbooks.

MOOCs emerged as a means of harnessing the potential of technology to transform traditional approaches to education and improve students' active learning (Hew & Cheung, 2014). MOOCs are considered an innovative form of online learning because they enable collaborative learning by encouraging learners to contribute to collective knowledge (Margaryan et al., 2015). MOOCs have revolutionized the education system by making education easily accessible to mass audiences worldwide (Shen & Kuo, 2015).

There are essentially two types of MOOCs: xMOOCs and cMOOCs. xMOOCs are instructive. They are based on traditional e-learning platforms, where the learner is the passive recipient of knowledge. In contrast, cMOOCs are connectivist. They are based on social learning, collaborative intelligence, and Web 2.0 tools (Fidalgo-Blanco et al., 2016).

The huge potential of xMOOCs to provide training without some of the traditional barriers to participation in elite education (e.g., cost and academic background) should drive differentiation of educational offers (Jordan, 2014). The intense, time-critical competition across elite higher education institutions has led these institutions to adopt xMOOCs as platforms based on viral technologies (McClure, 2014) that are capable of disrupting institutions through potentially high rewards combined with competitive risk (Daniel, 2012).

Despite xMOOCs' successful positioning within traditional Internet-based training programs, some authors have raised serious doubts over xMOOCs' future because of students' low interaction (Yousef et al., 2015; Ospina-Delgado and Zorio-Grima, 2016). Unlike in xMOOCs, instructors in cMOOCs play the key role of facilitating interactions, and learners actively contribute to collectively developing the content (Kaplan and Haenlein, 2016). cMOOCs' frameworks must integrate open intelligence practices, as also mentioned by Patton (2005) and Calof et al. (2017). Inspired by the growing field of open innovation, these practices provide a pertinent approach for addressing this shift from xMOOCs to cMOOCs.

cMOOCs enable learners to tap into collective intelligence communities to create and connect new knowledge through interactions with instructors, experts, and peers (Littlejohn et al., 2012). Self-regulation is a critical aspect of professional CI learning. In cMOOCs, highly self-regulated learners self-evaluate their performance against their own benchmarks and share their success stories with their peers. In contrast, learners in xMOOCs are much less self-regulated and tend to follow the course's instructional pathway (Littlejohn and Milligan, 2015).

cMOOCs require reconceptualization based on new educational variables or different interpretations of existing variables because learners in cMOOCs consider the digital learning context more relevant than the content or community (DeBoer et al., 2014). A certain cMOOC learning format is accepted because a specific digital learning offering is viewed as important only if its use is perceived as having clear benefits (Mertens et al., 2014). The knowledge discovery process within cMOOCs requires the use of mechanisms whereby learners actively build new ideas or concepts based on current and past knowledge and the creation of artifacts to advance and share collective knowledge (Chau et al., 2013). Prior studies have also examined key determinants of technology-mediated learning effectiveness and have proved that active experimentation is crucial because it enables learners to benefit from focal collective knowledge by putting their innovative ideas into practice and sharing outcomes with peers (Hu and Hui, 2012).

In this paper, we show that in CI cMOOCs, context outweighs content and community. A rich body of literature discusses the complex relationships between cMOOCs users' motivations, attitudes, and levels of engagement in a variety of learning contexts (Shapiro et al., 2017). A study of the community of practice's interest in cMOOCs showed that learners' perceptions of context positively moderate the relationship between students' knowledge acquisition while attending a cMOOC and intentions to revisit the content (Huang et al., 2017).

This study builds on prior research by examining whether current contexts and roles of learners influence how they self-regulate their learning style (Zimmerman et al., 2000; Cheng and Chau, 2013). Even if the confidence to participate and learn in a cMOOC is connected to familiarity with the content of the

cMOOC and its capacity to share knowledge via a community of practice, studies suggest that the context and current experience of cMOOC participants can influence their self-regulated learning behavior (Hood et. al., 2015). The need for further research on how cMOOCs can better support learners with different backgrounds relies on context (Barnard-Brak et al., 2010). The content of the knowledge construction process of learning communities through interactions is linked to community (Kent et al., 2016). Although cMOOCs are rapidly developing and gaining a prominent global profile, most fail to help learners remain focused on content. This problem occurs because most cMOOC designs do not offer learners an engaging experience. Engaging gamification mechanisms could solve this issue and help create highly effective cMOOCs (Chang and Wei, 2016). Greater cMOOC customization could lead to benefits for learners, who are the primary stakeholders of learning communities. This greater customization could thereby promote open opportunities of collaboration among instructors and across disciplines (Bruff et al., 2013).

As indicated by the Stanford Education Experiment (Leckart, 2012), a potential business model revolves around the ability of cMOOC providers to recommend successful learners to potential employers. The feasibility of this approach may vary across higher education institutions and cMOOC providers, depending on partnerships with employers or the creation of new partnerships through the production of high-profile cMOOCs (Burd et al., 2015).

Given the benefits of high-quality courseware content in business education, there is a need for CI cMOOCs. The future of intelligence studies in business enables the symbiosis of CI cMOOCs with new educational technology. Intelligence studies in business are about how content is built for the surrounding world of any private organization (Søilen, 2016).

The CI cMOOC design framework leverages the role of the cMOOC community, enriching interactions between its members according to their expectations and experience (Yousef et al., 2015; Ospina-Delgado and Zorio-Grima, 2016). Collaborative sense making of engaging a cMOOC target in active learning bridges the gap between decision-making literature and intelligence analysis (Baber et al., 2016). The CI cMOOC learning design overcomes the theoretical, methodological, and managerial mismatch of prior cMOOC practices by developing an active learning environment that fosters a willingness to change routines. This active learning environment is achieved by leveraging the capacity of CI to make sense of changing mindsets to encourage inquiry and experimentation (Moore et al., 2007). As prior studies have shown (Karagiorgi and Symeou, 2005), CI cMOOCs aim to foster motivation among learners, provide the opportunity for learners to develop foreknowledge decisional practices, and cope with problematic situations.

According to the active learning approach to training future CI skills, learning content challenges for cMOOC design are essential for achieving the outcome of overcoming the current vulnerabilities of poor instructional value added and inducing self-regulated learning behavior among learners from different contexts.

3. RESEARCH FRAMEWORK

CI cMOOC proof-of-concept constructs tailored to Lewin's force field model consist of the primary driving forces and restraining forces that condition the behavioral approach to CI cMOOC outcomes. The knowledge gap relates to the core factors that should be considered when developing a CI cMOOC. The methodological approach provides the understanding of the ability of a CI cMOOC's key features to train foreknowledge decisional practices.

The CI cMOOC proof of concept requires proxies to bridge the aforementioned knowledge gap. These proxies can be obtained using a data feedback tool that is built according to Lewin's framework. The proof of concept can be empirically tested against a sample of qualified target respondents who are interested in CI-based decisional problems.

We used purposive sampling to target a qualified audience with features of similar and dissimilar information-rich cases. This approach enabled ex-post data analysis of CI cMOOC learning benefits and enriched the CI knowledge base. The convenience sample consisted of 100 qualified learners who were enrolled in various business training MOOCs, where they gained experience in dealing with connectivist learning platforms.

The questionnaire was published online on Google Forms and sent through different online platforms. It was shared with scholars via Facebook, LinkedIn and other social media

Figure 1 Active learning landscape with the 3C- CI cMOOC device.

groups and pages dedicated to CI. The questionnaire had three sections, one for each element of the 3Cs research framework (content, context, and community). The items in the questionnaire were stimuli to which the respondents reacted. Each driving force item was contrasted with a restraining force item. Therefore, when answering, the respondent had to understand and react to the combined effect of two stimuli. The reported answer was not necessarily the same as it would have been if these two stimuli were not linked when answering.

When making sense of respondents' varying perceptions of items embedded in the research framework, the right interpretation of expected outliers is crucial. The existence of flaws in understanding learning connectivity's influence on sharing CI concerns raises the following research question: How does the target CI learning community perceive the capability of a cMOOC to train foreknowledge practices, given the best match between its content and context?

Table 1 CI cMOOC proof of concept constructs tailored to Lewin's force field model. Source: primary research.

Driving forces (positive for change)	**Restraining forces (obstacles to change)**
Content	
Ability to maximize the value of CI knowledge transfer based on highly interactive cMOOC content	CI cMOOC users' limited engagement with interactive content
Benefits of online multimedia resources embedded in CI cMOOC	Limited skills to deal with online multimedia resources embedded in CI cMOOC
Capability to properly address CI skills acquisition needs	Limited capability to address CI skills acquisition needs
Accessibility of CI cMOOC platform via mobile technology	Lack of CI cMOOC platform accessibility via mobile technology
Ability to embed a CI strategic behavior self-assessment tool in cMOOC	Limited capability of learners to understand the outcomes of the self-assessment tool embedded in cMOOC
Context	
Use of a serious game to foster CI cMOOC users' interest	Difficulties in assessing rich interactions within the CI cMOOC serious game
Trust in CMOOC instructors' CI background	Limited information about cMOOC instructors' CI background
CI skills acquisition through cMOOC	Low proficiency in CI skills acquisition through cMOOC
High interest in acquiring and developing CI skills	Limited interest in acquiring and developing CI skills
Capability to overcome learners' conflict of priorities	Limited capability to overcome learners' conflict of priorities
Community	
Potential for self-organized CI learning community	Learners' limited interest in belonging to self-organized CI learning community
Capability of CI cMOOC to enable the exchange of tips to acquire CI skills	Limited capacity of CI cMOOC to exchange tips to acquire CI skills
High interest in sharing CI skills	Limited interest in sharing CI skills
Ease of building a solid CI culture based on strategic thinking	Difficulties in building a solid CI culture based on capturing talent
Ability to support peer facilitator roles in the CI cMOOC community	Difficulties in enabling peer facilitator roles in the CI cMOOC community

3.1 Frame-related issues and areas of focus of the CI cMOOC proof of concept

The pertinence of leveraging active learning constructs of easily accessible actionable knowledge on CI still needs to be explored. Making sense of multiple causal links between the design of a cMOOC dedicated to active learning of competitive intelligence insights and pivoting around identified commonalities of supply and demand for cMOOCs, this current design framework's distinctive mission is meant to prove an innovative instructional program's capacity to adapt to change.

The key proposition of the 3C –CI cMOOC research framework relies on visualization with a Venn diagram of the interactions between the structural components of the instructional device (Figure 1). The mission statement with the adopted learning behaviour of the same is to enhance the learning gain by training its signaling role, when future CI decision makers should take leadership and make sense of the conflicting information generated with content, community and context.

Reflecting on the aforementioned causal links, the conceptual logic of the cMOOC design framework requires Lewin's force field analysis (1946) as a tailored method to highlight its pertinence, considering context, content, and community. Therefore, this study advances the CI cMOOC proof of concept research framework by deploying the constructs of the 3Cs framework (content, context, community) tailored to Lewin's force field model (Table 1).

The proposed cMOOC should capture the attention of potential users by providing professional CI content. The highly interactive content, enriched with multimedia resources, represents a driving force to achieve the aforementioned goal. However, highly interactive content could also be an inhibitor for certain target audiences that struggle to use specific tools embedded in the cMOOC. A major expected intangible advantage of CI cMOOCs is the ability to effectively address CI skills acquisition needs. The key issue is the ability of the online learning culture promoted by the CI cMOOC to unlock the potential of talented people. The trend toward mobile learning through CI cMOOCs and embedded strategic CI behavior self-assessment tools are also relevant issues in the framework's content section.

The goal of the CI cMOOC's conceptual and methodological framework would be incomplete without addressing contextual relevance. Integrating a serious game in the CI cMOOC could raise users' awareness and interest. However, the serious game's limits in the assessment process, beyond the simple output of a game grading system, must be clearly identified. Building trust in cMOOC instructors' CI background creates huge opportunities that could be captured during learners' CI skills acquisition and development processes. Because of the need to overcome learners' conflicts of priorities, a limited capability to deal with this issue could negatively affect CI cMOOC adoption.

Incorporating valuable insights from the salient literature, the current conceptual model coherently depicts the CI cMOOC constructs related to community as driving forces. These constructs are supporting self-organized CI learning communities of practice, stimulating interest in sharing CI skills, empowering learners to collaborate by highlighting peer facilitator roles, and enabling collective sense-making efforts to develop strategic thinking.

3.2 Conceptual architecture approach and hypotheses

To extend the debate in the CI knowledge community, the primary research question is addressed using two hypotheses, which are rooted in a novel conceptual architecture. Making sense of structuring knowledge creation within CI learning environments, the framework-related hypotheses are based on a novel methodological toolkit.

H1: The overall strength of the driving forces is greater than the overall strength of the restraining forces in the CI cMOOC 3Cs framework.

The CI target audience, which is sufficiently qualified in terms of expectations and demands, tends to replicate the learning environment clustering to make sense of supervised collective intelligence training. Nevertheless, there are wide gaps in less risk-free environments for decisional practices. These gaps become challenges once the real business restraining forces have been confronted. Community is rooted in cultural

grounds of valuing CI learning. Accordingly, we anticipate serious managerial challenges in adopting foreknowledge decisional practices on behalf of CI skills.

The Lewin's force field approach to the 3Cs of CI cMOOCs lends support to the current conceptual framing model, showing that the model coherently anchors the CI cMOOC constructs to train foreknowledge decisional practices. The discovery of all relevant recommendations regarding CI cMOOC actionability requires deeper reflection upon structuring knowledge and adjusting the methodological toolkit. H1 is supported by Lewin's force field approach. However, the CI cMOOC proof of concept still needs testing for actionability.

H2: A greater influence of context (instructor's support for learning) is associated with higher quality CI community of knowledge and higher satisfaction with content.

We propose an original data modeling framework test of truth to test whether there is support for a derived hypothesis. If H2 is supported, the empirical testing calls for further research to enrich our understanding and provide new knowledge on behalf of the assumption that context overcome both content and community. Furthermore, if H2 is supported, this study contributes to managerial practice by providing strategic decision assistance.

3.3 CI cMOOC construct reconfiguration

The proof of concept approach to CI cMOOCs means building upon the theory development process of CI cMOOC behavior by exploring antecedents of performance. It is assumed that, from the perspective of causality studies, the content variables represent the "personality" of the CI cMOOC; the context variables represent the "specialized as opposed to generic" learning process in which the CI cMOOC will be used; and the community variables represent the "behavior" of the CI cMOOC (i.e., its interaction with learners). Conceptually, content and context are independent variables that influence community but do not influence each other. We do not expect the CI cMOOC content to influence the context in which it will be used and vice versa. This can be expressed by Lewin's equation, where behavior is a linear function of personality and context.

The 30 questions were sorted into three groups of 10 matching pairs of items (stimuli). Each pair was formed of a driving force (D) and the corresponding restraining force (R). The variables were labeled as follows: CNT_Di and CNT_Ri (i = 1,…,5) for the pairs of items related to cMOOC content (CNT); CTX_Di and CTX_Ri (i = 1,…,5) for the pairs of items related to cMOOC context (CTX); and CTY_Di and CTY_Ri, (i = 1,…,5) for the pairs of items related to cMOOC community (CTY). In Lewin's force field analysis, it is assumed that the true stimuli to which the respondent must react is the pair of driving and restraining forces. Therefore, the following three groups of auxiliary variables were defined as follows:

CNT_DRi = CNT_Di - CNT_Ri, (i = 1,…,5);
CTX_DRi = CTX_Di - CNT_Ri, (i = 1,…,5);
CTY_DRi = CTY_Di - CNT_Ri, (i = 1,…,5).

3.4 Methods

The methods must match the observational nature of the data, which were gathered from a convenience sample rather than from a random sample or planned experience. A priori, the data were grouped into three clusters with predefined meanings. The methods had to be capable of determining whether the evidence supported these predefined groupings. For example, are the groups homogeneous? Moreover, can we provide evidence of underlying latent variables that can synthesize these groups of variables and reflect hidden influences in respondents' perceptions? The following statistical methods are concerned: descriptive statistics to characterize individual variables; multidimensional scaling to study the behavior of respondents when answering the questionnaire; Cronbach's alpha to confirm the homogeneity of the groups; principal component analysis to verify the unidimensional nature of the groups; and path modeling and partial least squares structural equation modeling (PLS-SEM) to explore the possible existence of causal relationships between respondents' answers. For the PLS-SEM, we used the "*plspm*" package (Sanchez, 2013) and the "*gesca*" package (Hwang and Takane, 2015) in R. For all other analyses, we used SPSS version 17.

4. FINDINGS

4.1 Force field analysis

First, analysis was performed using the outputs from the Force Field Tool in the PathMaker software. The average scores for the labeled CI cMOOC constructs were computed in Excel and then transferred into PathMaker software to be converted into strength arrows (Figures 2, 3, and 4).

The partial score for content (Figure 2) supports H1 (driving forces = 1.90; restraining forces = -0.96). The score was computed using the ranking of the following driving and restraining forces as perceived benefits in terms of content: accessibility of interactive content and mobile technology; willingness, curiosity, and engagement of respondents to continually upgrade their preliminary CI skills; and expectations and new actionable CI knowledge.

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	Central Issue:	CONTENT		
	Driving Forces	→	←	Restraining Forces
5	Ability to maximize the value of CI knowledge transfer based on highly interactive cMOOC content	→	←	CI cMOOC users' limited engagement with interactive content
6	Benefits of online multimedia resources embedded in CI cMOOC	→	←	Limited skills to deal with online multimedia resources embedded in CI cMOOC
7	Capability to properly address CI skills acquisition needs	→	←	Limited capability to address CI skills acquisition needs
8	Accessibility of CI cMOOC platform via mobile technology	→	←	Lack of CI cMOOC platform accessibility via mobile
9	Ability to embed a CI strategic behavior self-assessment tool in cMOOC	→	←	Limited capability of learners to understand the outcomes of the self-assessment tool embedded in cMOOC
10	Sum of Forces:	1.90000	-0.96435	

Figure 2 Driving vs. restraining forces for content.

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	Central Issue:	CONTEXT		
	Driving Forces	→	←	Restraining Forces
5	Use of a serious game to foster CI cMOOC users' interest	→	←	Difficulties in assessing rich interactions within the CI cMOOC serious game
6	Trust in CMOOC instructors' CI background	→	←	Limited information about cMOOC instructors' CI background
7	CI skills acquisition through cMOOC	→	←	Low proficiency in CI skills acquisition through cMOOC
8	High interest in acquiring and developing CI skills	→	←	Limited interest in acquiring and developing CI skills
9	Capability to overcome learners' conflict of priorities	→	←	Limited capability to overcome learners' conflict of priorities
10	Sum of Forces:	1.91666	-1.02654	

Figure 3 Driving vs. restraining forces for context.

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	Central Issue:	COMMUNITY		
	Driving Forces	→	←	Restraining Forces
5	Potential for self-organized CI learning community	→	←	Learners' limited interest in belonging to self-organized CI learning community
6	Capability of CI cMOOC to enable the exchange of tips to acquire CI skills	→	←	Limited capacity of CI cMOOC to exchange tips to acquire CI skills
7	High interest in sharing CI skills	→	←	Limited interest in sharing CI skills
8	Ease of building a solid CI culture based on strategic thinking	→	←	Difficulties in building a solid CI culture based on capturing talent
9	Ability to support peer facilitator roles in the CI cMOOC community	→	←	Difficulties in enabling peer facilitator roles in the CI cMOOC community
10	Sum of Forces:	1.88333	-1.01639	

Figure 4 Driving vs. restraining forces for community.

The partial context score (Figure 3) (driving forces = 1.91; restraining forces = -1.02) fails to provide unequivocal support for H1. Restraining forces were perceived as barriers, mostly because of confusion in the acquisition and development of CI skills and because of the limited benefits of active learning interactions. However, perceptions of driving forces still reflect respondents' interest in acquiring CI skills by building trust in further developing CI expertise in a cMOOC environment.

In this study, we analyzed the role of community. The community partial score (Figure 4) was as follows: driving forces = 1.88; restraining forces = -1.01. As expected, community seems to be less of a driver than context. Community was observed to be a less manageable area of change because respondents were sufficiently aware that many CI learning challenges, if not overcome, would magnify the vulnerabilities of CI skills transfer, jeopardizing their actionability in less risk-free environments. Figure 5 shows that the medians of the driving forces were greater than the medians of the restraining forces.

To confirm the validity of the 3Cs approach to CI cMOOC force field analysis, we performed a non-parametric test (Wilcoxon signed-rank test). This test allowed us to objectively decide whether the mean of the driving forces was equal, less than, or greater than the mean of

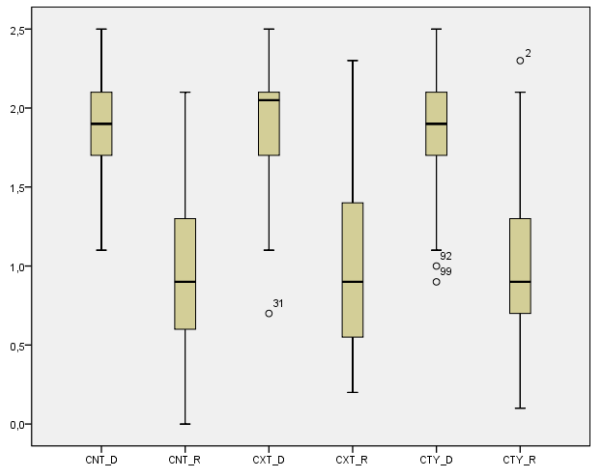

Figure 5 Distribution of medians of driving and restraining forces.

Table 2 Evidence of dominance of driving forces over restraining forces.

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
						Value	Std. Error	Value	Std. Error
CNT_D	100	1.1	2.5	1.898	.3272	-.111	.241	-.452	.478
CNT_R	100	.0	2.1	.969	.4888	.527	.241	-.328	.478
CXT_D	100	.7	2.5	1.922	.3463	-.801	.241	.654	.478
CXT_R	100	.2	2.3	1.023	.5272	.658	.241	-.503	.478
CTY_D	100	.9	2.5	1.875	.3176	-.878	.241	.697	.478
CTY_R	100	.1	2.3	1.019	.4935	.603	.241	-.319	.478
Valid N (listwise)	100								

the restraining forces. At the standard significance levels, the hypothesis of equal means was rejected in favor of the hypothesis that the mean of the driving forces is greater than the mean of the restraining forces. Compiling the partial influence scores of 3Cs CI cMOOC provided by PathMaker software, this study further highlights the in-depth analyses of the research framework.

4.2 Univariate descriptive statistics

Examining the results for univariate descriptive statistics reveals several key findings. In general, the variables representing driving forces had higher medians than the corresponding variables representing restraining forces (Figure 4 and Table 2). The variability of the restraining forces was considerably greater than the variability of the driving forces. This finding means that there was greater consensus among respondents in relation to driving forces than in relation to restraining forces. In addition, the asymmetry of the driving forces was negative (right asymmetry: dominance of larger values), whereas the asymmetry of restraining forces was positive (left asymmetry: dominance of smaller values). Positive values dominated negative values when we considered the net result of the driving force item minus the corresponding restraining force item. Thus, according to respondents, the driving force dominates the restraining force for most variables in the three groups.

4.3 Multidimensional scaling

The preliminary data analysis reveals good reasons to use multidimensional scaling (MDS) to study the meanings of the associations implicit in respondents' reactions to stimuli. MDS illustrates the topology of respondents' reactions (i.e., mental proximities between meanings of concepts) to items embedded in the proposed framework.

The visual mapping of pairwise gaps in Euclidean space provides insights to recalibrate the questionnaire toward assigning common meanings of the CI knowledge base. Furthermore, the CI cMOOC, defined as an interactional space of CI skills transfer, enables collaborative learning among instructors and users.

Using MDS to examine the outputs from these analyses yields several key findings. The points (Figures 6, 7, and 8) are defined as stimuli—the items that the respondents reacted to according to the meaning they attributed to those stimuli/items (interpretation). Therefore, if two stimuli are close to one another in the graph, this implies that all respondents interpreted them in a similar way. Conversely, a large distance between two stimuli in the graph implies that respondents interpreted these stimuli very differently.

Figures 6, 7, and 8 show that for content, context, and community, the driving and

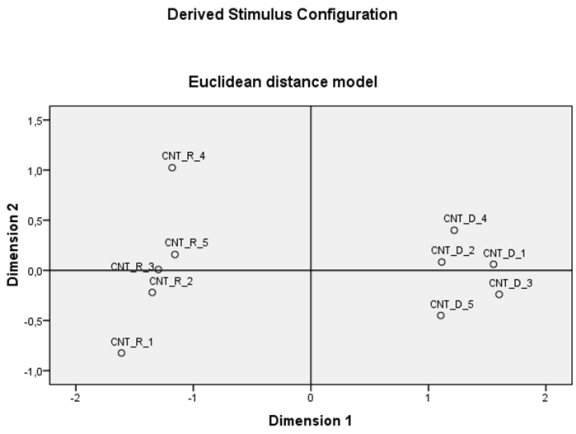

Figure 6 MDS (ALSCAL) proximity of content-related items in terms of respondents' interpretations of their meanings.

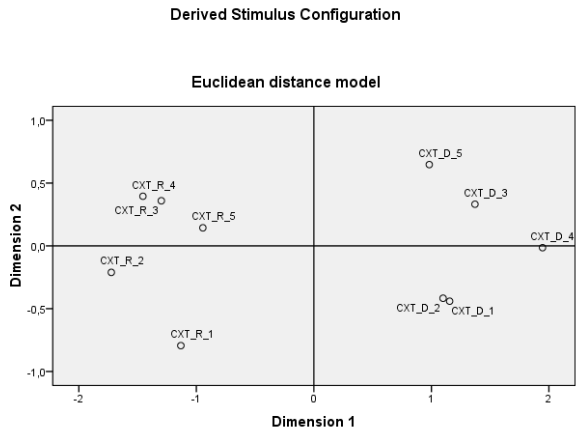

Figure 7 MDS (ALSCAL) proximity of community-related items in terms of respondents' interpretations of their meanings

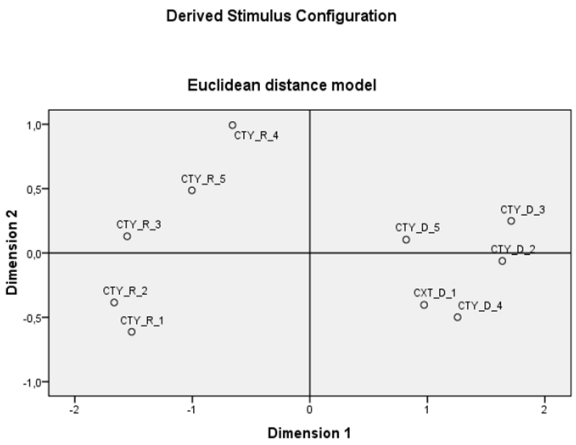

Figure 8 MDS (ALSCAL) proximity of community-related items in terms of respondents' interpretations of their meanings.

restraining forces were clearly interpreted differently by respondents, with driving forces on the right side of the three graphs and restraining forces on the left side. This separation correctly represents the intended opposition of these two types of forces. In relation to the assumed matching between driving forces and restraining forces for each pair, the situation was quite different. Specifically, for the content-related variables, the proximity of the points representing driving forces suggests that respondents struggled to distinguish the meanings of these variables—they form a group with small mutual distances. Consequently, we expect the variables DRi (= Di-Ri) to present some ambiguities for this dataset.

If both driving and restraining forces are projected on the vertical axis, the restraining forces' projections are generally a long way from the corresponding driving forces in the predefined matching. This should not occur if the respondents interpret the intended meaning of matched pairs of driving and restraining forces as expected. In other words, for most pairs, the alignment between driving and restraining forces is broken by respondents' perceptions. There are several possible explanations for this finding. First, the wording of the questions might have meant that different respondents attributed different meanings or that the intended meaning was not understood. Second, respondents might have incorrectly understood the instructions. For example, certain respondents did not associate each driving force with the intended matching restraining force. Finally, the driving force and restraining force items might not have been properly matched, for if they were properly matched, the pairs of items would be vertically aligned.

Respondents' perceptions of driving and restraining forces highlight the expected biased interpretation of the meaning of the 3Cs. Not only were respondents aware of the necessity of the CI cMOOC, but they also recognized the capability of this interactional space to provide support for CI decision practices.

Preliminary findings were used to analyze the alignments that seemed to emerge from the answers based on the proximities in the graph rather than the alignment of driving and restraining forces that resulted from the predefined matching. If the alignment of concepts (in terms of respondents' perceptions) was not the matched pair (D3, R3) but was rather (D3, {R2, R3}), then in subsequent analyses, D3 - (R2+R3)/2 would be used instead of D3-R3. Doing so enabled us to check the legitimacy of the latent variable against the principal component analysis. The associations found by comparing the intended vs. observed meanings of wordings support the assumption that a latent variable for each of CNT_DR, CTX_DR, and CTY_DR could emerge. The principal component analysis should further confirm the relevance of this issue.

4.4 Evidence for latent variables

The first principal component, in conjunction with Cronbach's alpha and the consistency of group correlations, helped check the assumption that the set of variables that formed a group could be represented by one latent variable of which those observed variables were coherent manifestations (Table

3). These latent variables can be interpreted as a common sentiment or attitude among respondents in response to the issues (content, context, and community). Table 3 shows the percentage of variance associated with the first and second principal components for each group of variables (CNT, CXT, or CYT). Table 3 also shows the values for the standardized Cronbach's alpha measure. Calculations were made using SPSS version 17.

Table 3 Percentage of variance associated with the first and second principal components and Cronbach's alpha for the three groups of variables. Var. = group of variables. CA = Cronbach's alpha for standardized items. 1PCV = First principal component variance percentage. 2PCV = Second principal component variance percentage. QV = quotient of variances. QV is calculated with 1PCV/2PCV.

Var.	CA	1PCV	2PVC	QV
CNT	*0.502*	*30.5*	*21.8*	*1.4*
CTX	*0.678*	*41.6*	*18.7*	*2.2*
CTY	*0.680*	*50.1*	*16.1*	*3.1*

The first principal component explains a large percentage of the variance (information) for the CTX and CTY groups of variables. Together with the high Cronbach's alpha values (approximately 0.7), this result suggests that these two groups can safely be synthetized by latent variables labelled LCTX and LCTY, respectively. The situation for the first group (CNT) is less clear. The first principal component explains only 1.4 times more variance than the second principal component does. Moreover, the value for Cronbach's alpha is only 0.5. The large percentage of variance that is explained by the first component suggests that the essential message of this group is captured by just one latent variable (labelled LCNT). Given the low value of Cronbach's alpha, however, we can expect greater error when interpreting this latent variable.

In summary, consistent with the previous results, the homogeneity of the groups CTX and CTY is greater than the homogeneity of the group CNT. It therefore makes sense to represent the meaning of respondents' opinions about CTX and CTY using the latent variables LCTX and LCTY. The homogeneity of CNT is much lower, so it makes sense to synthetize respondents' reactions to this group of variables using one latent variable (LCNT), but this variable should be complemented to account for the extra variability. In other words, the expected error is greater for CNT than it is for CTX or CTY.

4.5 Path analysis and model validation

Given our initial observations and according to the perspective of Lewin's force field model, it makes sense to specify and estimate the path model depicted in Figure 9, expressing the hypothesis that LCTY is a dependent variable explained by LCNT and LCXT. Respondents' reactions to the community concept are explained by their attitudes in relation to the concepts of content (expressed by the latent variable LCNT) and context (expressed by the latent variable LCXT). This hypothesis must be supported or contradicted by the available non-observational data.

The path model shown in Figure 9, following the usual conventions, expresses these beliefs: ellipses represent latent variables, rectangles represent indicators, and arrows represent causal assumptions. LCNT represents respondents' underlying opinions expressed when answering content-related questions. LCXT represents respondents' underlying opinions expressed when answering context-related questions. LCYT represents respondents' underlying opinions expressed when answering community-related questions. CNT_DR_i was computed by taking the differences between the answers to the ith driving force (D_i) and the corresponding restraining force (R_i) for i= 1,…,5.

Because data were observational and no distributional model was assumed, we used partial least squares path modeling (PLS-PM) as the estimation method. Concerns have been raised over the nature of results obtained using PLS-PM. One of the primary concerns is that this method, which is based on an iterative algorithm, assumes convergence for a specific solution. PLS-PM is therefore criticized for failing to guarantee the optimization of specific global criteria. The convergence might be to a local rather than a global optimum.

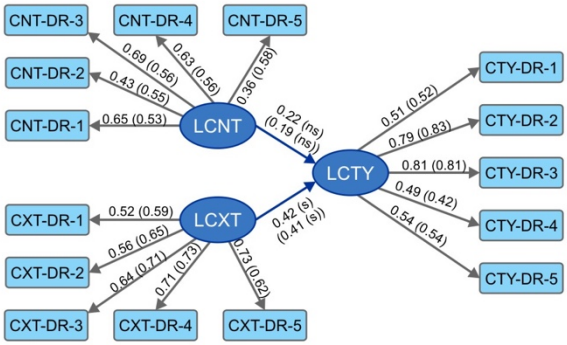

Figure 9 Path model relating latent variables LCNT, LCXT, and LCTY from the perspective of Lewin's force field model.

Generalized structured component analysis (GSCA) was employed to overcome the shortcomings of PLS-PM (Hwang and Takane, 2015).

The model specified in Figure 9 was estimated using both methods. To do so, we employed two R packages: "plspm" (Sanchez 2013) and "gesca" (Hwang and Takane, 2015). The results are presented and discussed simultaneously in the subsequent paragraphs, thereby enabling a comparative study.

The estimations of the structural model (strengths of associations between latent variables) and correlations (loadings) between manifest variables and the corresponding latent variable are expressed by the values along the arrows. The results provided by the "plspm" package are followed in parentheses by the values provided by the "gesca" package (Figure 8). The results are not identical, but they are similar and coherent. The causal relation LCNT -> LCTY is not supported by the data. This relationship was found to be non-significant by both methods at the 1% significance level. The causal relationship LCTX -> LCTY was found to be significant by both methods, with values of 0.42 (0.41). These results were confirmed using 1000 bootstrap samples. The model's goodness of fit for the two methods was similar: 0.3546 (0.3465). The overall goodness of fit was low, but it can be interpreted as acceptable for the purposes of this study.

Table 4 The one-dimensional character of each group of variables. Var = Variable type. Exo = Exogenous. Endo = Endogenous. CA = Cronbach's alpha. DG Rho = Dillon-Goldstein Rho.

Latent	Var	R2	CA	DG Rho	AVE
LCT	Exo	0.00 (0.000)	0.502	0.715	0.319 (0.335)
LXC	Exo	0.00 (0.000)	0.678	0.795	0.422 (0.437)
LCY	Endo	0.326 (0.291)	0.621	0.768	0.415 (0.417)

These results are complemented by the results in Table 4, which presents Cronbach's alpha, the Dillon-Goldstein Rho, and the average variance extracted (AVE; i.e., how much variance of each indicator is explained by the corresponding latent variable). The data in Table 4 confirm the discriminant validity of the measurement model, related to the one-dimensional character of the group of variables associated with the latent variables (Hwang and Takane 2015; Vinzi et al., 2010).

As mentioned earlier, the influence of LCT was non-significant at the 1% significance level. The influence of CTX on CTY was stronger. The respondents' accurate perceptions support the hypothesis that context dominates content, thereby achieving our research goal. The analysis provides preliminary conclusions about the pertinence of the research framework, tested within the empirical boundaries of the purposive sample. CNT homogeneity was much lower. It makes sense to synthesize respondents' reactions to this group of variables (CNT) as one latent variable, but this variable should be complemented to account for extra variability. In other words, the expected error was greater for CNT than for CTX or CTY. Note that respondents seemed puzzled by content-related questions. Before we reach a conclusion, this issue must be analyzed. Does this ambiguity result from an error by respondents or from an error in specification? It makes sense to match respondents' puzzled perceptions of content with divergent views of driving and restraining forces. Actual responders' misfits are reported with limited capability to address CI skills acquisition needs, platform accessibility via mobile technology and the outcomes of the self-assessment tool.

Respondents reactions to CONTENT construct is of upmost importance while higher variance challenges the fitness of foreknowledge decisional practices with unpredictability and not the informative role of CI knowledge base among participants.

The higher expected error of CNT than for CTX or CTY calls for reflection over reported misfits of respondents' perceptions about the satisfaction with content. The following insights should help the respondents to maximize the value of CI knowledge transfer with high interactive cMOOC content, while engaging in collective experimenting of unpredictability with decision aiding techniques.

The CI cMOOC content will be available to learners via personalized accounts and dashboards. The accounts will integrate learners' profiles (short biography, contact details and links to social media profiles) and their e-portfolios (all files submitted during assignments or discussions with their peers and instructors). The customized dashboards will embed the following features: list of modules (videos emphasizing theoretical issues

in CI, performed by reputable professors in this field from around the world), webinars (links for joining live webinar sessions, performed by CI practitioners; learners will have the opportunity to view and listen to recordings, if they missed the live webinars), gamification platform access (it will allow learners to self-assess their dominant CI behaviour: intelligence provider, vigilant learner, opportunity captor, or opportunity defender, while being immersed in a serious game, where they make data-driven decisions on specific scenarios), grades (each learner will receive assignments that have to be graded by professors who give video lectures) and technical support (in case a learner requests assistance, he/she will be redirected to the platform support team).

With founded preliminary support for the legitimacy of the latent variable (Section 4.4. Evidence for latent variables), we now focus on the unambiguous interpretation of latent variables for context and community. Although the overall quality for this model is moderate, the primary conclusion based on data from respondents is that context matters more than content when predicting CI cMOOC behavior.

5. CONCLUSIONS, IMPLICATIONS AND FURTHER RESEARCH

The conflictive nature of acquiring CI skills versus CI actionability relies on sharing versus concealing future anticipation, therefore the current research results inform about upgrading and contextualization of decision aiding techniques with CI cMOOCs.

In this study, we address the need to use an integrated CI knowledge system through a cMOOC platform, highlighting content, context, and community issues tested with 100 qualified respondents, who acknowledged their missing CI skills. We are fully aware that the implementation of the CI cMOOC requires further development, especially in terms of funding. Therefore, we evaluate our ideas by creating a proof of concept that will encourage the business community to support the CI cMOOC, which yields benefits for each participant in terms of access to essential information and knowledge to address current micro and macro environmental issues.

Learners' knowledge background and their variety, within the capacity to recall significant experience of contextualization, must be checked against a predictable performance environment for delivering results. That matches the collective intelligence process design approach to intelligently align both role settings of a qualified CI skill individual and the organizational learning environment, a unique recipe prone to autonomously generate foreknowledge decisional practices, such as deploying context-specific CI practices.

The primary outcome of a successful CI cMOOC is its capacity to deliver on its promise, based on validated learnings regarding context-over-content and context-over-community. The instructor's primary role is to trigger the CI cMOOC's learning interactional space, dominated by incentives to challenge CI foreknowledge decisional practices.

The CI cMOOC constructs highlight pre-matched pairs of driving force and restraining force questions for each group of variables (i.e., content, context, and community). The test of medians provides insight into common perceptions of driving forces. It therefore legitimates the collaborative approach to connectivity in sharing concerns, while perceptions of restraining forces highlight the need to reconcile bias in interpretations of future obstacles.

The values of Cronbach's alpha and the estimation based on principal component analysis suggest that there is an underlying latent variable for each group of variables. Each latent variable embodies respondents' reactions to one of the constructs (i.e., content, context, or community). These findings were reinforced by examining the cross-correlations using PLS-PM and GSCA.

Capitalizing on the acquisition of learners' CI skills, the instructor's role is to adopt a sequential approach to CI learning, increasing collective exposure to connective rules of engagement in training CI skills. Acting as a moderator in reflective judgment, the instructor makes sense of collective learning returns on experience to enrich CI content.

The instructor's role is to deter the learner's propensity to avoid real-world challenges so that the learner can seize opportunities by using newly acquired CI skills. The CI cMOOC's specific context of acquiring skills has the greatest impact within the CI community of learning, thereby enabling collective adaptation behavior regarding the interpreter's selection of CI content. Our findings show that CI context adjustability represents the main challenge of the CI cMOOC as an innovative learning device. The CI cMOOC's impact on transferring new skills to foreknowledge practices is conditioned by the similarities between the controlled

learning environment and the application of CI skills to real business scenarios.

The accountability of learners' applied CI knowledge is influenced by learners' capacity to replicate the context of learning without instructor mediation, autonomously delivering results in terms of scanning, filtering, interpreting, selecting, reacting, and adjusting to recognizable signs, blind spots, and opportunities. Closing the gap between similarities of risk-free training in an environment of CI skills and dissimilarities within the complexity of delivering results makes sense for developing early warning systems as foreknowledge decisional practices.

An awareness of the gap between the risk-free cMOOC training environment and the real business environment calls for collective learning returns on experience. By purposefully leveraging constructs of active learning, managerial practices of CI configurations to fit CI artifacts and developing organizational design capabilities to anchor patterns of foreknowledge decisional practices.

A proof-of-concept approach to the CI learning landscape requires the reconceptualization of artifacts of learnable and non-learnable CI skills to address significant concerns over the replicability of training foreknowledge decisional practices to deliver results in real businesses. The designed artifact bridges the gap in recognizing a random approach to active learning in CI communities, matching respondents' puzzled perceptions of content, enriched with unique combinations of divergent views about future challenges. The positioning of the CI cMOOC relies upon respondents' future gains in acquiring CI skills to individually delivering upon trained foreknowledge decisional practice within risky business environments.

The viability of the CI cMOOC proof of concept requires further confirmation from the business community regarding the contribution of CI skills to support foreknowledge decision practices. It is expected that CI cMOOCs will match CI communities of learners' gains in terms of businesses' expectations of improvements in foreknowledge decision practices. Nevertheless, learners will be able to display an increasing capacity to confront CI challenges.

Regarding its contribution to theory, this study provides insights into the foundations of decision science in addressing the emerging paradigm of an open intelligence approach to CI MOOC collective training versus a CI approach to delivering pertinent skills. Variability in learners' CI knowledge level should be checked against the real business environment.

The tailored learning behavior approach of the CI cMOOC proof of concept enables learners to deliver results in applying CI skills and highlights the influence of contextual intelligence over content and community. Managerial practice gains strength when replicable CI knowledge recognizes early enough future competitive challenges, enhances trust in moderating risk exposure to support decision making and induces valuable self-regulated learning behavior. One managerial implication is that the CI cMOOCs can enhance the collective intelligence approach to developing foreknowledge decision practices in the organizational learning process by sequentially increasing respondents' exposure to learnable CI skills. Another insightful implication of the study lies with sharing responsibility of CI decision makers to actively engage with instructors and designers, aiming to enrich the cMOOC context of training skills. A social implication resides on enabling the affordability of opportunities provided by the CI knowledge sharing within the CI cMOOC community of learners. Scaling highlights another social outcome, leading to the increase of the future CI cMOOC's social impact.

CI cMOOCs emerge as a disruptor to corporate learning, providing companies with an innovative digital platform design to share CI skill sets, while challenging an outdated corporate culture. CI cMOOCs as a training provider should focus on corporate coaching needs in their endeavor for accurately measuring the impact of CI acquired skills on the companies' outcome. The 3C approach to CI cMOOCs will imply the renewal of the CI content to enhance the CI community interactions, aiming to shape core CI skill sets, while strengthening the impact of CI training outputs over company outcomes.

Scholars should replicate this study to validate the CI cMOOC constructs of discovering knowledge through active learning, transferring knowledge of CI skills, and capitalizing on acquired skills. Further studies should legitimate the value of the CI cMOOC context of applying skills aligned with highly specific competitive pressures.

6. REFERENCES

Baber, C., Attfield, S., Conway, G., Rooney, C. and Kodagoda, N., 2016. Collaborative sense-making during simulated Intelligence Analysis Exercises. International Journal of Human-Computer Studies, 86, pp.94-108.

Barnard-Brak, L., Paton, V.O. and Lan, W.Y., 2010. Profiles in self-regulated learning in the online learning environment. *The International Review of Research in Open and Distributed Learning*, 11(1), pp.61-80.

Bratianu, C. ed., 2015. *Organizational Knowledge Dynamics: Managing Knowledge Creation, Acquisition, Sharing, and Transformation: Managing Knowledge Creation, Acquisition, Sharing, and Transformation*. IGI Global.

Bruff, D.O., Fisher, D.H., McEwen, K.E. and Smith, B.E., 2013. Wrapping a MOOC: Student perceptions of an experiment in blended learning. *Journal of Online Learning and Teaching*, 9(2), p.187.

Burd, E.L., Smith, S.P. and Reisman, S., 2015. Exploring business models for MOOCs in higher education. *Innovative Higher Education*, *40*(1), pp.37-49.

Calof, J., Richards, G. and Santilli, P., 2017. Integration of business intelligence with corporate strategic management. *Journal of Intelligence Studies in Business*, *7*(3).

Chang, J.W. and Wei, H.Y., 2016. Exploring engaging gamification mechanics in massive online open courses. *Educational Technology & Society*, *19*(2), pp.177-204.

Chau, M., Wong, A., Wang, M., Lai, S., Chan, K.W., Li, T.M., Chu, D., Chan, I.K. and Sung, W.K., 2013. Using 3D virtual environments to facilitate students in constructivist learning. *Decision Support Systems*, *56*, pp.115-121.

Cheng, G. and Chau, J., 2013. Exploring the relationship between students' self-regulated learning ability and their ePortfolio achievement. *The Internet and Higher Education*, *17*, pp.9-15.

Daniel, J., 2012. Making sense of MOOCs: Musings in a maze of myth, paradox and possibility. *Journal of interactive Media in education*, *2012*(3).

DeBoer, J., Ho, A.D., Stump, G.S. and Breslow, L., 2014. Changing "course" reconceptualizing educational variables for massive open online courses. *Educational researcher*, *43*(2), pp.74-84.

Etzkowitz, H., 2010. The Triple Helix: University–Industry–Government Innovation in Action. *Tomsk State University of Control Systems and Radioelectronics Publ*.

Fidalgo-Blanco, Á., Sein-Echaluce, M.L. and García-Peñalvo, F.J., 2016. From massive access to cooperation: lessons learned and proven results of a hybrid xMOOC/cMOOC pedagogical approach to MOOCs. *International Journal of Educational Technology in Higher Education*, *13*(1), p.24.

Fuld, L.M., 1995. *The new competitor intelligence: the complete resource for finding, analyzing, and using information about your competitors* (pp. 417-436). New York: Wiley.

Hew, K.F. and Cheung, W.S., 2014. Students' and instructors' use of massive open online courses (MOOCs): Motivations and challenges. *Educational research review*, *12*, pp.45-58.

Hood, N., Littlejohn, A. and Milligan, C., 2015. Context counts: How learners' contexts influence learning in a MOOC. *Computers & Education*, *91*, pp.83-91.

Hu, P.J.H. and Hui, W., 2012. Examining the role of learning engagement in technology-mediated learning and its effects on learning effectiveness and satisfaction. *Decision support systems*, *53*(4), pp.782-792.

Huang, L., Zhang, J. and Liu, Y., 2017. Antecedents of student MOOC revisit intention: Moderation effect of course difficulty. *International Journal of Information Management*, *37*(2), pp.84-91.

Hwang, H. and Takane, Y., 2014. *Generalized structured component analysis: A component-based approach to structural equation modeling*. Chapman and Hall/CRC.

Joksimović, S., Dowell, N., Poquet, O., Kovanović, V., Gašević, D., Dawson, S. and Graesser, A.C., 2018. Exploring development of social capital in a CMOOC through language and discourse. *The Internet and Higher Education*, *36*, pp.54-64.

Jordan, K., 2014. Initial trends in enrolment and completion of massive open online courses. *The International Review of Research in Open and Distributed Learning*, *15*(1).

Kahaner, L., 1997. *Competitive intelligence: how to gather analyze and use information to move your business to the top*. Simon and Schuster.

Kaplan, A.M. and Haenlein, M., 2016. Higher education and the digital revolution: About MOOCs, SPOCs, social media, and the Cookie Monster. *Business Horizons*, *59*(4), pp.441-450.

Karagiorgi, Y. and Symeou, L., 2005. Translating constructivism into instructional design: Potential and limitations. *Journal of Educational Technology & Society*, *8*(1), pp.17-27.

Kent, C., Laslo, E. and Rafaeli, S., 2016. Interactivity in online discussions and learning outcomes. *Computers & Education*, *97*, pp.116-128.

Leckart, S., 2012. The Stanford education experiment could change higher learning forever. *Wired Magazine*, *20*, pp.122-128.

Lewin, K., 1946. Force field analysis. *The 1973 Annual Handbook for Group Facilitators*, pp.111-13.

Littlejohn, A. and Milligan, C., 2015. Designing MOOCs for professional learners: Tools and patterns to encourage self-regulated learning. *eLearning Papers*, *42*.

Littlejohn, A., Milligan, C. and Margaryan, A., 2012. Charting collective knowledge: Supporting self-regulated learning in the workplace. *Journal of Workplace Learning*, *24*(3), pp.226-238.

Mackness, J., Waite, M., Roberts, G., & Lovegrove, E. (2013). Learning in a small, task–oriented, connectivist MOOC: Pedagogical issues and implications for higher education. *The international review of research in open and distributed learning*, *14*(4).

Margaryan, A., Bianco, M. and Littlejohn, A., 2015. Instructional quality of massive open online courses (MOOCs). *Computers & Education*, *80*, pp.77-83.

McClure, M.W., 2013. MOOCs: Hope and hype in viral technologies and policies. *Excellence in Higher Education*, *4*(1), pp.7-24.

McGonagle, J.J. and Vella, C.M., 2002. *Bottom line competitive intelligence*. Greenwood Publishing Group.

Mertens, A., Stöter, J. and Zawacki-Richter, O., 2014. Predictors of perceived importance and acceptance of digital delivery modes in higher education. *Research in Learning Technology*, *22*.

Moore, A.H., Fowler, S.B. and Watson, C.E., 2007. Active learning and technology: Designing change for faculty, students, and institutions. *Educause Review*, *42*(5), pp.42-44.

Ospina-Delgado, J. and Zorio-Grima, A., 2016. Innovation at universities: A fuzzy-set approach for MOOC-intensiveness. *Journal of Business Research*, *69*(4), pp.1325-1328.

Patton, K. M. (2005). The role of scanning in open intelligence systems. *Technological Forecasting and Social Change*, 72(9), 1082-1093.

Prince, M.J. and Felder, R.M., 2006. Inductive teaching and learning methods: Definitions, comparisons, and research bases. *Journal of engineering education*, 95(2), pp.123-138.

Ranga, M., and Etzkowitz, H. 2015. Triple Helix systems: an analytical framework for innovation policy and practice in the Knowledge Society. In *Entrepreneurship and knowledge exchange* (pp. 117-158). Routledge.

Sanchez, G., 2013. PLS path modeling with R. *Berkeley: Trowchez Editions*, *383*, p.2013.

Shapiro, H.B., Lee, C.H., Roth, N.E.W., Li, K., Çetinkaya-Rundel, M. and Canelas, D.A., 2017. Understanding the massive open online course (MOOC) student experience: An examination of attitudes, motivations, and barriers. *Computers & Education*, *110*, pp.35-50.

Shen, C.W. and Kuo, C.J., 2015. Learning in massive open online courses: Evidence from social media mining. *Computers in Human Behavior*, *51*, pp.568-577.

Søilen, K.S., 2016. A research agenda for intelligence studies in business. *Journal of Intelligence Studies in Business*, *6*(1).

Esposito Vinzi, V., Chin, W.W., Henseler, J. and Wang, H., 2010. *Handbook of partial least squares: Concepts, methods and applications*. Heidelberg, Dordrecht, London, New York: Springer.

Yousef, A.M.F., Chatti, M.A., Wosnitza, M. and Schroeder, U., 2015. A cluster analysis of MOOC stakeholder perspectives. *International Journal of Educational Technology in Higher Education*, *12*(1), pp.74-90.

Zimmerman, B.J., 2000. Attaining self-regulation: A social cognitive perspective. In *Handbook of self-regulation* (pp. 13-39). Academic Press.

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Competitive intelligence as a game changer for Africa's competitiveness in the global economy

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ABSTRACT This article presents a "competitiveness intelligence" conceptual framework developed from a literature review for adaptation by African countries to improve their competitiveness in the global economy. The role of competitive intelligence in national competitiveness has been shrouded with a lot of controversy in this era of trade liberalisation, globalisation and the fourth industrial revolution. We see Africa's poor performance in the global competitiveness rankings. Research findings, however, show a positive nexus between competitive intelligence and competitiveness, though not much is known pertaining to Africa. The presented conceptual framework will, however, act as a catalyst for the adoption of competitive intelligence by African countries to improve their performance in the global economy. This article is of great importance to policymakers, researchers and academia. Furthermore, given the history and importance of competitive intelligence in economic development, the conceptual framework has the potential to inspire many African countries through subsequent adaptions.

KEYWORDS Africa, competitive intelligence, competitiveness, global economy

1. INTRODUCTION

The role of competitive intelligence in the global economy has attracted a lot of controversy and attention from researchers, policy makers and intelligence professionals. Some have taken competitive intelligence (CI) to mean business or economic espionage. Dishman and Calof (2008) and Casado-Salguero and Jiménez-Quintero (2016) cited by Salguero et al. argue that CI is based on the environmental school of strategic management and plays a very important role in the development and deployment of both national and corporate strategies. Colakoglu (2011) argues that people must not confuse CI with economic espionage. Richardson and Luchsinger (2007) cited in Colakoglu (2011) state that "economic espionage is unlawful and unethical while CI is legal and associated with a detailed code of ethics." To Bisson (2014), the scope of CI goes beyond entities, as new forms of territorial governance must include tools and methods of CI to optimise the creation of knowledge and intelligence. François (2008) and Moinet (2009) cited by Bisson (2014) argue that this is defined as territorial CI.

According to Barnea (2013), for many years, intelligence capabilities have been recognized as one of the basic skills of a state, while decision-makers demand quality intelligence on which they can depend. To Juhari and Stephens (2006):

> "CI has become an indispensable part in strategic decision-making aspect of [companies] and nations. As history has shown, intelligence engagements have always been the forefront of military

processes, where country leaders and high ranking government officials use intelligence to make crucial decisions for political sovereignty, protection of countries and their people, for creating and maintaining strategic alliances and for predicting the future of their countries. It is apparent that the purposes for intelligence use in governing a nation are parallel to managing a business, where CI has a significant role in business survival, in maintaining relationships with other businesses, counterintelligence, short-term and long-term aims and objectives."

With the advent of globalisation, a term that was introduced in the 1980s, the role of intelligence becomes more visible and is strengthened by the increase in competition among nations. To Afzal (2007), globalisation simply means growing integration of national economies, openness to trade, financial flows, foreign direct investment and the increasing interaction of people in all facets of their lives. It further implies the internationalisation of production, distribution and marketing of goods and services.

Globalisation brought with it both benefits and detriments. To Todaro and Smith (2003), globalisation presents new possibilities for eliminating global poverty and globalisation can benefit poor countries directly and indirectly through cultural, social, scientific and technological exchanges as well as trade and finance. Some very important low-income countries like India and China have used globalisation to their advantage and have succeeded in achieving enviable economic growth rates and thus reducing some international inequalities (Afzal, 2007). Dollar and Kraay (2004) note that over half of the developing countries that have embraced globalisation have benefited tremendously through increased trade and tariffs reduction. Globalisation has also played a critical role in poverty reduction through the integration of economies. It has also helped improve the competitiveness of nations.

Opponents, however, argue that globalisation has worsened inequalities both across and within countries. This has caused serious competition across and within countries with developed countries establishing dominance over poor and developing nations. The effects are seen in environmental degradation, climate change and ballooning national debts. Streeten (1998) observes that economic liberalisation, technological changes, and competition in both labour and product markets have contributed to economic failure, weakening of institutions and social support systems, and erosion of established identities and values. To Afzal (2007), globalisation has been bad for Africa and in many parts of the world for employment as international competition is forcing both governments and firms to 'downsize' and to adopt all necessary steps to save labour costs. These negative effects of globalisation might be a result of many factors affecting governments' decision making processes, one of which includes lack of actionable intelligence critical in competitive environments. This argument is supported by authors such as Lee and Karpova (2018), who state the importance of actionable intelligence in determining a country`s competitiveness in the new global arena. The lack of CI in many African countries may therefore contribute to the negative effects of globalisation as pointed out by Afzal (2007).

Organisations such as the World Economic Forum (WEF), International Institute for Management Development (IMD) and the World Bank's International Finance Corporation (IFC) have provided national economic metrics since the 1970s. For example, the WEF provided frank overviews of nations' competitiveness. These measurements have spurred robust debates among policymakers. Recently, the WEF introduced a new methodology that strengthens the importance of the role of human capital, innovation, resilience and agility. This is in context with technological changes espoused by the Fourth Industrial Revolution (FIR). Despite years of positive talk about Africa's economic growth, Africa's performance leaves much room for improvement as shown by competitiveness indexes. For example, the global competitiveness index (GCI) shows Africa's diverseness at the bottom of the rankings. Among the 148 economies covered by the WEF survey, Mauritius is 49 and South Africa 67, barely in the top half of the ranking. It is argued that the root causes of slow growth and inability to leverage on new opportunities offered by the FIR continue to be the old developmental issues such as institutions, infrastructure, culture and skills among many other factors. Much attention is required on basic factors such as health, skills, good governance and financial prudence. Africa, on average, is the worst region across all 12 pillars of competitiveness as measured by the WEF's

GCI, with major weaknesses in the basic enablers or drivers of competitiveness such as security, rule of law, red tape and corruption. Of particular concern also is the unsustainable level of public debt, with the average public debt-to-GDP ratio, for example, in sub-Saharan Africa, increasing from 32.4% in 2014 to 45.9% in 2018.

Despite these traditional weaknesses, CI can still play a critical role in the continent's future, leveraging on the continent's resource base, young growing population and technological advancement of the FIR. It is the centrality of knowledge and actionable intelligence in decision making and policy formulation that places Africa in a position that requires the embracement of CI to enhance its competitiveness in the global economy. To date, only South Africa and Nigeria have taken a serious stance in embracing the concept of CI through opening the SCIP's chapters. This is a commendable move towards competitiveness, though certain quarters feel that SCIP is an American influence. However, this can be adopted with certain amendments to suit the African context. In recent years, information and knowledge have become two important elements in decision making at both corporate and national levels. Informed decisions are critical in resource allocation, production and marketing. Theories such as competitive advantage theory (Porter, 1990), comparative advantage theory (Krugman and Obstfeld, 2000) and the new growth theory (Romer, 1986 and Krugman, 1990) will be utilized in this study as they have proved to be critical in national competitiveness. Lee and Karpova (2018) argue that, in the new global environment, knowledge becomes a central factor in determining competitiveness.

The purpose of this article is to develop a conceptual framework that enhances Africa's competitiveness as a continent in the global family of nations leveraging on its untapped natural resources, human capital intelligence, young population and vast virgin lands. To help construct this framework, CI and competitiveness indicators will be complimented by expert opinions and current research findings as explained in the methodology section below. What needs to been seen is whether embracing CI will help Africa achieve its 2063 seven aspirations for socio-economic transformation or if there are other factors that are critical in addressing Africa's challenges at the global level. The remainder of the article is divided into four sections.

2. LITERATURE REVIEW

2.1 Definition of terms

In his article entitled, "Competitive Intelligence and Firm Competitiveness: An overview," Alexander Maune (2014) provides an in-depth analysis and definitions of the terms competitive intelligence (CI) and competitiveness. A number of definitions have been provided by a number of different authors and this article will be guided by the following definitions taken from the above-mentioned article.

Pellissier and Nenzhelele (2013) define CI "as a process or practice that produces and disseminates actionable intelligence by planning, ethnically and legally collecting, processing and analyzing information from and about the internal and external or competitive environment in order to help decision-makers in decision-making and to provide a competitive advantage." This definition is in line with Casado-Salguero and Jiménez-Quintero (2016) cited by Salguero et al. (2017) who define CI as "a set of practices aimed at gathering information from the business environment ethically and legally, in order to transform it into intelligent information useful for strategic decision-making and, therefore, leading to business success and survival." To Barnea (2013) CI has its roots from national intelligence that involves secret state activities to understand or influence foreign entities. Barnea (2013) further argues that, governmental decision-makers are aware that intelligence is an important and often critical tool to the national decision-making process. To him CI is based on the "intelligence cycle" (www.cia.gov, 2013 and Omand, 2010).

CI adopted the discipline of national intelligence and applies it to its needs, with necessary modifications. According to Field Manual [FM] 34-3 (1990), CI operations follow a four-phase process known as the intelligence cycle. The intelligence cycle is oriented to the mission (FM 34-3, 1990); this can be for the country or organisation. The FM 34-3 (1990) reports that, "Supervising and planning are inherent in all phases of the cycle. The intelligence cycle is continuous. Even though the four phases are conducted in sequence, all are conducted concurrently. While available information is processed, additional information is collected, and the intelligence

staff is planning and directing the collection effort to meet new demands. Previously collected and processed information (intelligence) is disseminated as soon as it is available or needed."

Competitiveness is defined in Maune (2014a) as the abilities of individual firms, or whole sectors, regions and even countries to successfully assert themselves in the domestic and global market. It is not only a result of entrepreneurial activity of individual firms, but also a result of an appropriate structural policy, functioning competitive policy and adequate infrastructure. Competitiveness is also seen a multidimensional concept that refers to the ability by nations, industries, and firms to create sustainable competitive advantages in the global market. Globalization of markets has created the need to enhance companies' and countries' competitiveness more rapidly hence the call for the adoption of CI. This is in line with arguments by Romer (1986) and Krugman (1990) who in the new growth theory propose that knowledge significantly increases production output in an industry, even with the same amount of traditional inputs, such as labour and capital. Subsequently, the industry competitiveness increases substantially, especially in highly sophisticated sectors. However, since CI is about how to gather and analyse information and this is predominantly done through the internet with the help of software, Africa is at a great disadvantage due to poor or lacking internet access and connectivity.

2.2 Global overview of the role of competitive intelligence on competitiveness

Theoretical debates have generally focused on the increasing roles and functions of CI on competitiveness. CI plays an intermediation role between economic development and its factors. According to Rouach and Santi (2001), "CI's benefits were long understood in the states of pre-modern Germany." Rouach and Santi (2001) further argue that "more modern German intelligence grew in the 18th century, and by scouting the European Continent the Germans discovered they could compete with British and French firms by applying foreign scientific advances to their own industrial processes." Because of that, the Germans rapidly developed their own base of education and research that was used as a foundation for technological innovation (Rouach and Santi, 2001).

Rouach and Santi (2001) state that "Japan was also early endowed with a grasp of the importance of CI." To Rouach and Santi (2001), Japan and intelligence have grown hand-in-hand. Information serves as the axis and central structural support of the nation's companies." Herring (1992) in Fleisher and Wright (2009) comments "that Japanese corporate CI capabilities are well developed, benefiting both commercial and governmental programs, which in turn support Japan's international competitiveness." To Fleisher and Wright (2009), Kahaner (1996) observes that "CI has had a significant influence in the country's prosperity and claims; 'it is their absolute and unbending belief in CI as a strategic corporate tool to make the best decision possible. CI is the secret to their continued success.'" Søilen (2017) argues that "Japan and Sweden are mentioned as examples of countries that do take this discipline seriously."

Kahaner (1996) cited by Global Intelligence Alliance [GIA] (2004) provides the following arguments regarding the impact of intelligence:

> "The impact of intelligence operations is indirect, just like in advertising, when the decision-maker does not know which part of the budget is actually responsible for the profit. Similarly, there is usually no direct causal relationship between revenues and the money spent on a particular piece of intelligence. Therefore, it may be difficult to justify intelligence expenditures to top management. One way of looking at the gains is to evaluate how much money the company has lost by not having effective intelligence. Even so, it is difficult to prove that a lost deal or a late product launch was in fact due to inaccurate information about the competitors' actions or customer preferences."

According to Prescott and Bhardwaj (ref. Herring, 1999) cited in GIA (2004) argue that, "the benefits of CI are directly identifiable, although there are no quantitative measures to support this. An improved market position and improved revenue/profits are not directly identifiable since they are 'uncertain effects.'" These benefits fall into the category of bottom-line measures, which are usually the most commonly requested.

Fleisher and Wright (2009) cite Chao (1998) and Tao and Prescott (2000) who state that

"…Chinese leaders have considered intelligence as a useful means of helping the country to overcome its relative isolation from other economic and global trading systems." Fleisher and Wright (2009) further state that "Tzu made the case for intelligence as a key element of warfare when he wrote, 'know the enemy and know yourself; in a hundred battles you will never be in peril. When you are ignorant of the enemy but know yourself, your chances of winning or losing are equal. If you are ignorant of both your enemy and yourself, you are certain in every battle to be in peril'".

Du Toit and Strauss (2010) cite Viviers et al. (2005) who argue that the business environment in Africa is highly complex thereby affecting the competitiveness of the continent. Trade liberalisation and globalisation have exposed Africa to foreign competition. Du Toit and Strauss (2010) opine that "trade liberalization and globalisation together with the problems posed by fluctuating financial markets and unstable political conditions call for effective CI practices." To Du Toit and Strauss (2010), no nation can develop and compete without adequately organizing its CI. Du Toit and Strauss (2010) further state that, "CI as a business discipline has formed an integral part of efforts to enhance the competitive behavior of African companies and society as a whole. Entry into the global economy requires high-grade CI." Du Toit and Strauss (2010) state that "CI has long been acknowledged as a strategic management means to improve competitiveness." CI becomes critical in decision making processes and policy formulation. According to Sewdass and Toit (2014), "CI has a positive impact on economies and on the quality of lives of citizens."

The current information/knowledge generation has placed CI at the centre stage for competitiveness and economic growth. Previously, factors such as capital, labour and natural resources were traditionally considered as the only factors that matter for economic growth. Maune (2014b) argues that, the emergence of the internet and online databases have offered an almost inexhaustible supply of information that has caused information overload in many instances.

Calof and Skinner (1999) in Maune (2014c) argue that a country is likely to underperform without an appropriate CI infrastructure. They further state in Sewdass and Toit (2014) that, "countries such as France, Sweden, Japan and Canada have recognized the value of government and industry working jointly in the development of an intelligence culture." According to Sewdass and Toit (2014), "the new paradigm in development economics is based on self-analysis, self-reliance and self-renewal, which would seem to necessitate a development-orientated intelligence policy in a country." Pellissier and Kruger (2011) cited in Sewdass and Toit (2014), opine that "utilising CI enables companies in developing countries to gain a greater market share and to compete successfully against international competitors." The implementation of CI contributes to the generation of FDIs in developing countries through value addition and beneficiation given the natural resources that are in abundance. Maune (2014a) and Maune (2015) state that "reliable global information has become central to national success, whether the need is for knowledge of an industry, a market, a product or a competitor." CI is now at the cutting edge of competition, survival and growth of economies (Maune, 2014b).

Degerstedt (2015) argues that "the objective of CI is to understand how the surrounding competitive environment will impact an organization – by monitoring events, actors, trends, research breakthroughs, and so forth – in order to be able to make relevant strategic decisions." A major trend in the world today is the increasing competition in global and digitalized markets where the speed of change and innovation is becoming faster than ever before due to developments in information technology (Degerstedt, 2015). CI provides a better understanding of the dynamic global world. However, Søilen (2017) argues that new technology is also a threat to companies as today, when every individual is a potential spy. He further argues that corporate espionage has also become a big problem with its consequences still underestimated.

2.3 Competitive intelligence and competitiveness in Africa

Literature shows that limited research has been conducted on CI and competitiveness in Africa. The state of CI remains fragmented in Africa. With the exception of South Africa and Nigeria that have managed to establish SCIPs chapters, nothing much is taking place in other domains in the African continent regarding CI. A SCIP chapter was launched in SA in the mid-1990s and, albeit slowly, companies are becoming increasingly competitive minded.

Until that time, research into CI in South Africa had also been limited. The first comprehensive research projects [in Africa] were launched in the beginning of the century in South Africa. Before that, only a few papers were written on CI (Viviers and Muller, 2004 in Viviers et al., 2005). Du Toit and Strauss (2010) in Maune (2015) state that as a result of factors such as history, culture, diversity, geography, and political and institutional landscape, the business environment in Africa is highly complex, and this has affected its competitiveness in the global economy.

Maune (2015) argues that, for CI to flourish in Africa and for the discipline to be implemented and used optimally, there has to be an appropriate awareness of CI and a culture of competitiveness. Du Toit and Strauss (2010) point out that African society also tends to favour collectivist. Collectivism, in contrast with individualism, refers to a society, in which people from birth onwards are integrated into strong, cohesive in-groups, which throughout people's lifetimes continue to protect them in exchange for unquestioning loyalty (Mersha, 2000). Without proper empirical evidence of CI as a source of competitiveness, awareness and attitudes that favour both CI and information sharing, it is difficult to develop CI programmes within the African continent (Du Toit and Strauss, 2010). Research shows that South Africa and Morocco have taken greater strides in in designing national competitive intelligence systems. There has been a number of studies that have been carried out in South Africa, in particular on CI practices, showing how the concept has been developed in that country in comparison with other African countries.

Table 1 shows the poor performance of African countries in terms of global competitiveness rankings as given by the literature. This table helps in building a case for the need to adopt competitiveness strategies by African countries, through embracing CI. These figures are important for decision making and policy formulation as well as policy targeting by African countries to achieve sustainable growth and compete meaningfully in the global economy.

3. METHODOLOGY

The purpose of this article is to construct a 'competitiveness intelligence' conceptual framework that can be adopted by African economies. This article offers a conceptual framework based on a literature review. It uses grounded theory rather than description of data as stressed by Strauss and Corbin (1990). This is important for research in order to establish the exact focus of the study and its potential contribution. One of the aims of science is theory testing or building, as without thorough literature reviews it would be impossible to achieve this. The authors identified two major differences between theory and descriptions. This article was also informed by the procedures expounded by Jabareen (2009) in his study entitled, "Building a conceptual framework: philosophy, definitions, and procedure." This article adopted the Wilsonian methods of concept analysis (Wilson, 1963, 1987). These are based on a philosophical design, a literature study and intellectual analysis without empirical (qualitative or quantitative) methods.

A literature review was conducted on some of the peer-reviewed and published journal articles on CI in Africa. To identify relevant literature and journals, academic databases and search engines were used. A review of references in related studies led to more relevant sources, the references of which were further reviewed and analysed. Keywords including 'competitive intelligence,' 'business intelligence,' 'tactical intelligence,' 'market intelligence,' 'corporate intelligence,' 'competitor intelligence,' 'social competitive intelligence,' 'technological intelligence,' 'product intelligence,' and 'strategic intelligence' were used in search engines to find relevant sources. To ensure reliability, peer-reviewed articles were manually reviewed. The researcher skimmed through the text of the journal articles first, checking whether it was relevant for the purpose of this research article. Reviewing data of existing journal articles was necessary to enhance the generalisability of the findings (Morse, 1999). The purpose of this review was to identify the contributions of research in advancing the understanding of the concepts that make CI. Criteria for inclusion of articles in the review included the following:

- Written in English
- Published in a peer-reviewed journal
- Cited CI concepts

In developing this conceptual framework, the researcher did not simply review and summarised some body of theoretical or empirical publications but also considered other conceptual resources for current

knowledge, such as unpublished papers, dissertations in progress, and grant applications, as well as in the heads of researchers working in the field of CI as suggested by Locke et al. (2007). The researcher worked closely with advisors in the field of CI. The researcher also brought in ideas from outside the traditionally defined field of CI and integrated different approaches, lines of investigation, or theories that had no previous connections. The researcher's purpose was not only descriptive, but also critical. The researcher used literature not as an authority to be deferred to, but as useful but fallible sources of ideas about developments in CI. The researcher developed the framework to serve as the basis for understanding the causal or correlational patterns of interconnections across events, ideas, observations, concepts, knowledge, interpretations and other components of CI.

Table 1 Global competitiveness ranking, 2012 – 2019 for African countries. Source: Author's own compilation, constructed from literature specifically for this study.

Country	**GCI 2019**	**GCI 2018**	**GCI 2016/17**	**GCI 2015/16**	**GCI 2014/15**	**GCI 2013/14**	**GCI 2012/13**
	Rank /141	***Rank /140***	***Rank /138***	***Rank /140***	***Rank /144***	***Rank /148***	***Rank /144***
Morocco	75	75	70	72	72	77	70
Algeria	89	92	87	87	79	100	110
Tunisia	87	87	95	92	87	83	-
Egypt	93	94	115	116	119	118	107
Mauritius	52	49	45	46	39	45	54
South Africa	60	67	47	49	56	53	52
Rwanda	100	108	52	58	62	66	63
Botswana	91	90	64	71	74	74	79
Namibia	94	100	84	85	88	90	92
Kenya	95	93	96	99	90	96	106
Côte d'Ivoire	118	114	99	91	115	126	131
Gabon	119	-	108	103	106	112	99
Ethiopia	126	122	109	109	118	127	121
Cape Verde	112	111	110	112	114	122	122
Senegal	114	113	112	110	112	113	117
Uganda	115	117	113	115	122	129	123
Ghana	111	106	114	119	111	114	103
Tanzania	117	116	116	120	121	125	120
Zambia	120	118	118	96	96	93	102
Cameroon	123	121	119	114	116	115	112
Lesotho	131	130	120	113	107	123	137
Gambia, The	124	119	123	123	125	116	98
Benin	125	123	124	122	-	130	119
Mali	129	125	125	127	128	135	128
Zimbabwe	127	128	126	125	124	131	132
Nigeria	116	115	127	124	127	120	115
Madagascar	132	-	128	130	130	132	130
Congo, DRC	139	135	129	-	-	-	-
Liberia	-	-	131	129	-	128	111
Sierra Leone	-	-	132	137	138	144	143
Mozambique	137	133	133	133	133	137	138
Malawi	128	129	134	135	132	136	129
Burundi	135	136	135	136	139	146	144
Chad	141	140	136	139	143	148	139
Mauritania	134	131	137	138	141	141	134
Seychelles	76	74	-	-	-	-	-
Eswatini	121	120	-	-	-	-	-
Guinea	122	126	-	-	-	-	-
Burkina Faso	130	124	-	-	-	-	-
Angola	136	137	-	-	-	-	-

4. DEVELOPING THE "COMPETITIVENESS INTELLIGENCE" CONCEPTUAL FRAMEWORK

Trade liberalization and globalisation have exposed Africa to serious global competition. This has been a wakeup call for Africa to increase its competitiveness. Many suggestions have been tabled on how Africa can improve its competitiveness globally. This study has, however, resulted in the construction of a conceptual framework as a result of the confluence of CI and competitiveness. The conceptual framework in Figure 1 was developed out of this confluence and Figure 2 shows a more refined and straight-forward framework. CI is defined as a process or cycle in the literature section above and competitiveness is defined as the ability of a country (region, location) to deliver the beyond-GDP goals for its citizens today and tomorrow.

Although there are different theoretical approaches to the measurement of competitiveness, three well known indices include the Global Competitiveness Report prepared by the WEF, The World Competitiveness Yearbook prepared by the IMD and Business Competitiveness - Ease of Doing Business Report prepared by the IFC. These are all prominent and have been used to construct the "competitiveness intelligence" conceptual framework described herein. Owing to different definitions, indices and data sources these approaches use, rankings of competitiveness of countries are different, hence countries are encouraged to follow either one approach or to follow them concurrently. These approaches use a multitude of indicators—partly hard data, partly survey results—to assess the competitiveness of countries. This has the advantage of measuring a wide range of economic aspects, which potentially reduces measurement error and help cope with the complexity of the problem, such as differences in countries' starting position and socio-economic systems. A disadvantage of "large indicator approaches" is that they sometimes lack a clear concept.

The reason why African countries must embrace CI is that very few seem to know themselves. For example, very few countries in Africa can quantify the amount of mineral resources they have. Very few keep up to date statistics that are critical for decision making and negotiating deals, for example, with investors. Investment in CI should be a starting point for many African countries and this should be embraced at a grassroots level. Educational programs need to address competitive intelligence issues especially in this era of big data analytics, artificial intelligence and connectivity. Calof and Viviers (2001) indicate that appropriate education about intelligence is the only way to develop correct attitudes towards CI, and that awareness of CI can be enhanced through responsible reporting of intelligence results by the media, associations and other opinion leaders, as was the case in Canada and the USA. They add that the most successful technique for stimulating CI within organisations is to conduct training sessions for each industry.

To cement the centrality of CI in achieving national competitiveness Lee and Karpova (2018) reformulate the definition of competitiveness. To Lee and Karpova (2018), "Competitiveness is an ability to achieve a high standard of living through productivity growth in the new global environment, where knowledge [CI] becomes a critical factor." Although macroeconomic fundamentals have been considered critical in explaining economic development trends, CI has long been acknowledged as a strategic management means to improve competitiveness (Viviers and Muller, 2004 and De Pelsmacker et al., 2005).

The Space Age, electronic, global village and the FIR era have seen the phantasmagoria of events, ideas, and images, exploding worldwide. This era has marked the dawn of a new reality, that is, truly global in its nature, snowballing with the enormity of its ideas and the velocity of its changes. The present era is even more accelerative, so much that countries need to embrace CI to remain competitive in the global economy. CI touches a number of fields and areas, including:

- Market intelligence,
- Competitor intelligence,
- Technological intelligence,
- Operational intelligence,
- Strategic intelligence,
- Product intelligence and
- Social competitive intelligence (Degerstedt, 2015)

Degerstedt (2015) states that a new term called "social CI" will be used to refer to any CI process, method or tool that is adapted for the

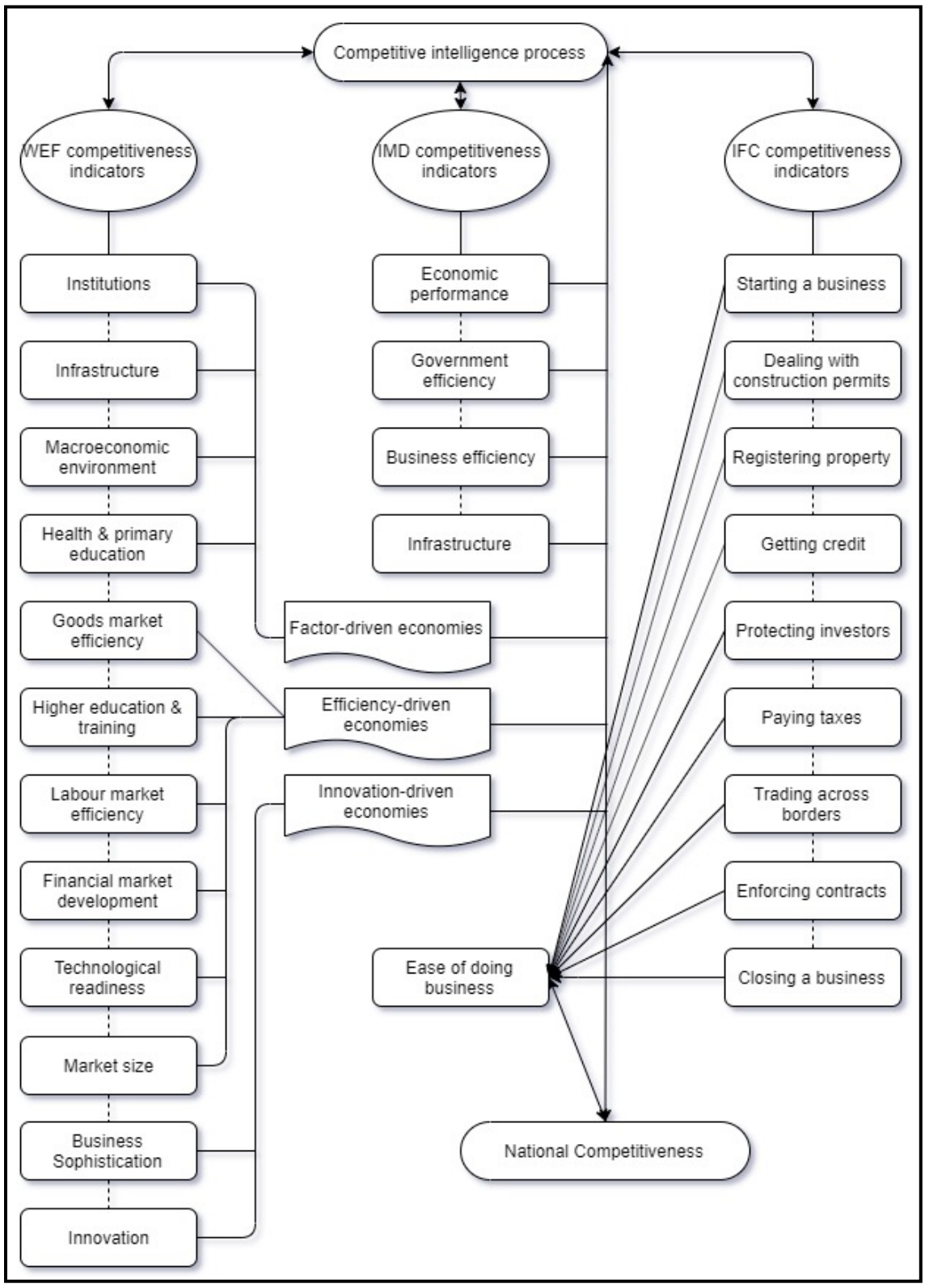

Figure 1 Competitiveness Intelligence conceptual framework. Created for this study from a literature review.

networking organization. Social CI relies on notions of enterprise 2.0 and wikinomics, using systemic principles such as openness, participation, individual freedom, democracy, self-organization, sharing and co-creation.

CI programs are generally project-oriented, going after knowledge to address or answer a specific question. Facilitators and teams are formed around key issues, and then let loose to find the key information that leads to the best strategic or tactical decision. CI identifies knowledge gaps and then goes out and fills them. CI has also been identified as critical in designing economic policy and programs (Calof, et al., 2015).

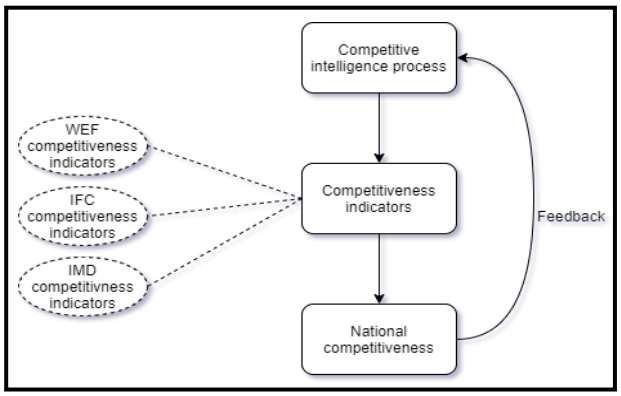

Figure 2 Simplified "competitiveness intelligence" conceptual framework. Created for this study from a literature review.

There is need for the continent to fully embrace CI so as to achieve meaningful and sustainable growth rates given the abundant natural resources as well as the intellectual capacity. CI must be the focal point in policy formulation and strategic planning within government structures. CI provides the foundation or starting point in policy direction and this is critical as it identifies the countries' strengths, weaknesses, opportunities and threats. The effort is worth investing as it gives government direction in resource allocation. The role of information in this technological era cannot be over emphasized, hence the need for governments to join hands with academia and the private sector to fully embrace CI towards economic growth and development. CI will help governments formulate sustainable policies that are growth oriented by providing the much-needed intelligentsia. Governments can make use of the available national and military intelligence resources or refocusing them towards economic development and growth. These institutions are well established and resourced with intellectual capabilities in a number of economic areas such as cyber technology, agriculture technology, artificial intelligence, FinTech and medicine. Innovative ideas and technologies must be seen emanating from these institutions. These institutions must be the source of start-up companies as well as spillovers to the corporate sector, and creating synergies with academia and the private sector.

A well-designed system of CI can help nations in the strategic planning process, as well as in determining the intent and ability of their competitors in the global economy, and also determine the extent of the risks to which they may be exposed to. Although organisations and countries are well aware of the methodologies and tools of CI, it is not possible to transpose them directly to a developing country, as careful analysis of the CI cultural context must be undertaken to understand the existing business culture. This was the conclusion by Dou and Manullang (2004) in a research study on CI and regional development in Indonesia.

African countries must emulate innovative approaches from countries such as Israel to grow their economies in a sustainable manner. There must be a confluence between private sector, government and academia for African countries to develop and compete meaningfully in the global economy. Africa must also create an environment that promotes innovation and creativity through establishing technological hubs, venture capital markets and tolerance to failure. CI growth in Africa must be promoted through academic development (courses and research), corporate activity (exporting firms) and government activities.

For example, the Canadian government has come up with three broad programs to develop CI (Calof, 2016). A program aimed at enhancing its own ability to develop CI, a program for industry and others to develop CI as well as a program to help communities develop CI for local economic development. A review of these programs shows the positive economic impact of CI. The following are some of the programs that can promote CI:

- Training initiatives and creating intelligence units,
- Sponsoring industry and others to develop CI (joint projects between government, academia and business working together to develop CI),
- Sponsoring communities to develop CI or local economic development,
- Joint intelligence assistance, for example, French government CI assistance to companies and associations through the chamber of commerce (Bisson, 2014) and in Israel where military, academia and business have come together in the Negev desert to develop a cyber-city (Nakashima and Booth, 2016).

Another example is Sweden, which for the last several decades has shown a great increase in the interest in intelligence as a topic. Hedin (2004) argues that this interest has come from the government, from associations, from universities and from companies and organizations that have seen a greater need for CI. These developments in modern Swedish CI

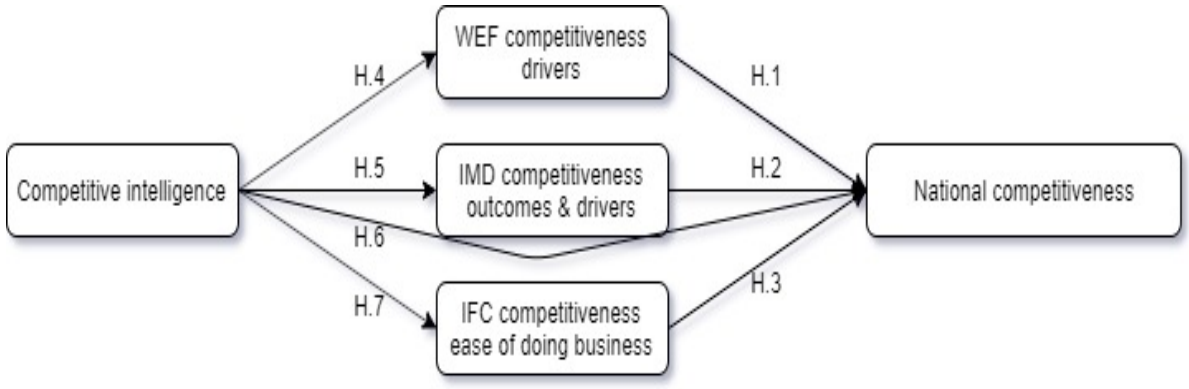

Figure 3 Proposed research model and hypotheses. Created for this study from a literature review.

have led to a mature and competitive CI industry in comparison to that of other European countries. As of 2004, intelligence education and training was offered by no less than nine universities, five colleges, four private companies and five governmental institutions (Hedin, 2004). In Sweden, all men are required to participate in military service for a period of 9-18 months. Intelligence and communication were then two topics that were taught. Since it is obvious from a military perspective that it is virtually impossible to act properly without good intelligence, this lesson has been learned by many that later continued with a career in business (Hedin, 2004). This has helped shape the CI industry in Sweden in a greater way.

Information or intelligence has proven to be a critical factor in economic growth the world over. Hughes (2005) argues that in order for an organization or country to be competitive, a successful strategy to locate itself in the market is vital. He further argues that CI is a tool to increase competitiveness hence the arguments by Viviers et al. (2005), that countries must inculcate cultures that value information and intelligence, in their response to why Europe and Asia are the leaders in CI. To Du Toit and Strauss (2010), hardly any nation can develop and compete without adequately organizing its information infrastructure and Africa suffers from poor infrastructure-physical, institutional and procedural.

Intelligence had been in use since the Exodus of Egypt when Moses sent the 12 spies to the Land of Canaan, the Promised Land (Torah, Numbers Chapter 13). Many countries made use of intelligence during and after World War II to industrialize through economic espionage, which has been proven to be illegal. Since then, CI has been developed to gather critical intelligences in a legal and more acceptable way. The "competitiveness intelligence" conceptual framework will be critical in influencing policy formulation, implementation, as well as policy targeting through provision of the much-needed critical intelligentsia. This conceptual framework will also help trigger debate and further future research on the role of CI in national competitiveness, especially in Africa. Although theoretically CI is argued to influence competitiveness, very few empirical studies have been done to test and determine the direction of this relationship. Therefore, as much as there is theoretical evidence supporting the positive relationship between CI and competitiveness there is need to test empirically this relationship. The proposed hypotheses will go a long way in providing such evidence.

The researcher proposes to follow a simplified research model and hypotheses (Figure 3), derived from the literature review, for the purposes of future research:

Hypothesis 1 (H1). *WEF competitiveness drivers have a positive effect on national competitiveness.*

Hypothesis 2 (H2). *IMD outcomes and drivers have a positive effect on national competitiveness.*

Hypothesis 3 (H3). *IFC ease of doing business has a positive effect on national competitiveness.*

Hypothesis 4 (H4). *CI has a positive effect on WEF competitiveness drivers.*

Hypothesis 5 (H5). *CI has a positive effect on IMD competitiveness outcomes and drivers.*

Hypothesis 6 (H6). *CI has a positive effect on national competitiveness.*

Hypothesis 7 (H7). *CI has a positive effect on IFC ease of doing business.*

A model constructed on the basis of the variables and hypotheses described above is expressed in Figure 3. This model will help identify the factors that influence national competitiveness through CI, in addition to analyzing how these factors are interrelated. This relationship can be analysed through structural equation modelling in R.

5. CONCLUSION

In this article the researcher started with a brief background of CI and competitiveness as well as defining these two concepts. The influence of trade liberalization, globalisation and the FIR was also assessed in the context of competitiveness. Measurements of competitiveness as given by institutions such as the WEF, IFC and IMD were also taken into consideration as these were critical in tracing Africa's performance globally. Theories such as the new growth theory by Romer (1986) and Krugman (1990) were also looked at and their role in influencing CI adoption. Lee and Karpova's (2018) argument on the centrality of knowledge in national competitiveness formed the backbone of this article. Research also shows that CI adopted the discipline of national intelligence and applies it to its needs, with necessary modifications.

The global overview of CI and competitiveness was also taken into consideration, tracking it back to the Chinese fighting their isolation from other economic and global trading systems as provided by Chao (1998) and Tao and Prescott (2000). Japan and some European countries were also analysed in the theoretical review. Arguments by researchers such as Calof and Skinner (1999), Rouach and Santi (2001), Fleisher and Wright (2009), Sewdas and Toit (2014), Degerstedt (2015) and Soilen (2017), among others, were considered in building the case for the development of the conceptual framework for adoption by African countries. Reasons as to why countries need CI now more than ever were also given.

The article also provided a brief background analysis of CI and competitiveness in Africa with Table 1 denoting the GCI for African countries performance rankings from 2012 to 2019, taken from WEF's global competitiveness reports. Arguments by Viviers and Muller (2004), Du Toit and Strauss (2010) and Maune (2015) that the business landscape in Africa is highly complex due to its historical, cultural, diversity and political factors were noted as these had seriously affected Africa's competitiveness globally.

A brief methodology informed by a literature review was presented and data was gathered for the construction of the "competitiveness intelligence" conceptual framework as presented in Figure 1 and Figure 2. Section four of the article presents the development of the conceptual framework and some analysis.

The researcher recommends the adoption of other research methods to measure the impact of CI on competitiveness in Africa as the field of CI has proved critical in influencing economic growth and development in developing countries. Commentators, knowledge management experts and intelligence researchers, that is, business and competitive intelligence alike, are always looking for better ways of doing things through intelligence. The following will be areas that can stimulate future academic research: the impact of CI on economic growth in Africa, big data and CI in developing countries, CI, AI and unstructured data (social media intelligence) in Africa, intelligence and policy – the evolving relationship and intelligence community and policy-maker integration. Also crucial to the adoption and implementation of CI is the three-legged approach to the embracement of CI towards economic growth and development, that is, the confluence of government, academia and the private sector. CI is critical as was stated in literature in providing economic solutions to challenges facing Africa as it moves ahead with its Agenda 2063. Some of these challenges, if not all, are due to lack of actionable intelligence.

6. REFERENCES

Afzal, M. (2007). "The impact of Globalisation on Economic growth of Pakistan," *The Pakistan Development Review,* Vol. 46(4)(II), pp. 723-734.

Barnea, A. (2013). "National Strategic Intelligence and Competitive Intelligence and what is in between," *National Strategic Intelligence and Competitive Intelligence,* Vol. 16(3), pp. 37-44.

Bisson, C. (2014). "Exploring Competitive Intelligence Practices of French Local Public Agricultural Organisations," *Journal of*

Intelligence Studies in Business, Vol. 4(2), pp. 5-29.

Calof, J. (2016). "Government sponsored Competitive Intelligence for regional and sectoral economic development: Canadian experiences," *Journal of Intelligence Studies in Business,* Vol. 6(1), pp. 48-58.

Calof, J. L. and Viviers, W. (2001). "Creating an intelligence society in South Africa," *Africa Insight,* Vol. 31(2), pp. 61–67.

Calof, J., and Skinner, B. (1999). "Government's role in competitive intelligence: What's happening in Canada?" *Competitive Intelligence Magazine*, Vol. 2(2), p. 1–5.

Calof, J., Richards, G., and Smith, J. (2015). "Foresight, competitive intelligence and business analytics tools for making industrial programs more efficient," *Foresight-Russia*, Vol. 9 (1), pp. 68-81.

Casado-Salguero, G. and Jiménez-Quintero, J. A. (2016). "Competitive intelligence in the tourism sector, with special focus on Southern Europe," *Tourism & Management Studies,* Vol.12(1), pp. 136-144.

Chao, J. (1998). "Factors affecting the competitiveness of China-based companies," *Competitive Intelligence Review,* Vol. 9(3), pp. 39–45.

Colakoglu, T. (2011). "The Problematic of Competitive Intelligence: How to Evaluate & Develop Competitive Intelligence?" *Procedia Social and Behavioral Sciences,* Vol. 24, pp. 1615–1623.

De Pelsmacker, P., Muller, M.L., Viviers, W., Saayman, A., Cuyvers, L., and Jegers, M. (2005). "Competitive intelligence practices of South African and Belgian exporters," *Marketing Intelligence & Planning,* Vol. 23(6), pp. 606–620.

Degerstedt, L. (2015). "Social competitive intelligence: sociotechnical themes and values for the networking organization," *Journal of Intelligence Studies in Business*, Vol. 5(3), pp. 5-34.

Dishman, P. L. and Calof, J. L. (2008). "Competitive intelligence: a multiphasic precedent to marketing strategy," *European Journal of Marketing,* Vol. 42(7-8), pp. 766-785.

Dollar, D. and Kraay, A. (2004). "Growth is Good for the Poor," *World Bank Working Paper No.2587,* World Bank.

Dou, H. and Manullang, S. D. (2004). "Competitive intelligence and regional development within the framework of Indonesian provincial autonomy," *Education for Information,* Vol. 22(2), pp. 99–123.

Du Toit, A. S. A., and Strauss, C. (2010). "Competitive Intelligence and Africa`s Competitiveness: what`s happening in South Africa," *Unisa Press,* Vol. 28(2), pp. 17-31.

Field Manual 34-3 (1990). *Intelligence Analysis.* Headquarters Department of the Army. Washington, DC. U.S.A.

Fleisher, C. S., and Wright, S. (2009). "Examining Differences in Competitive Intelligence Practice: China, Japan, and the West," *Thunderbird International Business Review*, Vol. 51(3), pp. 249-261.

François, L. (2008). *Intelligence territoriale: l'intelligence économique appliquée au territoire*. Paris: Lavoisier.

Global Intelligence Alliance (March, 2004). Measuring the Benefits of Competitive Intelligence. GIA White Paper. Retrieved May 8, 2014 from http://www.globalintelligence.com.

Hedin, H. (2004). "Evolution of Competitive Intelligence in Sweden," *Journal of Competitive Intelligence and Management,* Vol. 2(3), pp. 56-75.

Herring, J. (1992). "Business intelligence in Japan and Sweden: Lessons for the US," *Journal of Business Strategy,* Vol. 13(2), pp. 44–49.

Herring, J. (1999). "Key Intelligence topics: A process to identify and define intelligence needs," *Competitive Intelligence Review,* Vol. 10(2) (4). John Wiley & Sons Inc.

Hughes, S. (2005). "Competitive intelligence as competitive advantage: the theoretical link between competitive intelligence, strategy and firm performance," *Journal of Competitive Intelligence and Management,* Vol. 3(3), p. 5.

Jabareen, Y. (2009). "Building a conceptual framework: Philosophy, definitions, and procedure," *International Journal of Qualitative Methods,* Vol. 8(4), pp. 49-62.

Juhari, A. S., and Stephens, D. (2006). "Tracing the Origins of Competitive Intelligence throughout history," *Journal of Competitive Intelligence and Management,* Vol. 3(4), pp. 61-82.

Kahaner, L. (1996). *Competitive Intelligence: How to guide, analyze, and use information to move your business to the top*. N.Y.: Simon and Schuster.

Krugman, P. (1991). "Industry competitiveness and economic geography," *The Journal of Political Economy*, Vol. 99, No. 3, pp.483–499.

Krugman, P. R. and Obstfeld, M. (2000). *International Economics: Theory and Policy*, Addison-Wesley, Reading.

Lee, J. and Karpova, E. (2018). "Revisiting the competitiveness theory in the new global environment: review and analysis of the competitiveness definition," *Int. J. Competitiveness*, Vol. 1, No. 3, pp.189–205.

Locke, L. F., Spirduso, W. W., and Silverman, S. J. (2007). *Proposals that work: A guide for planning dissertations and grant proposals* (5th Ed.). Thousand Oaks, CA: Sage.

Maune, A. (2014a). "Competitive Intelligence as an Enabler for Firm Competitiveness: An Overview," *Journal of Governance and Regulation*, Vol. 3(2), pp. 29-42.

Maune, A. (2014b). "Competitive Intelligence as an important Contributor to the Growth of Banks: A Zimbabwean Perspective," *Journal of Governance and Regulation,* Vol. 3(3), continued – 1, pp. 98-112.

Maune, A. (2014c). "Competitive Intelligence in South Africa: A Historiography," *Corporate Ownership & Control,* Vol. 11(4), continued – 7, pp. 635-642.

Maune, A. (2015). *Competitive Intelligence as Economic Phenomena*. Virtus Interpress, Ukraine.

Moinet, N. (2009). "L'intelligence territoriale entre communication et communauté stratégique de connaissance: l'exemple du dispositif régional de Poitou-Charentes," *Revue Internationale d'Intelligence Économique,* Vol. 1(1), pp. 29-38.

Morse, J. M. (1999). "Qualitative Generalisability," *Qualitative Health Research*, Vol. 9(1), pp. 5-6.

Nakashima, E., and Booth, W. (2016, May 14). How Israel is turning part of the Negev Desert into a cyber-city, *The Washington Post*.

Omand, D. (2010). *Securing the State,* C. Hurst and Co. Publishers Ltd, 113-137.

Pellissier, R., and Nenzhelele, T. E. (2013). "Towards a universal definition of Competitive Intelligence," *S.A. Journal of Information Management,* Vol. 15(2), Art. No. 559, 7 pages.

Porter, M. E. (1990). *Competitive Advantage of Nations*, Free Press. New York.

Richardson, L., and Luchsinger, V. (2007). "Strategic Marketing Implications in Competitive Intelligence and the Economic Espionage Act of 1996," *The Journal of Global Business Issues*, Vol. 1(2).

Romer, P. M. (1986). "Industry competitiveness and long-run growth," *The Journal of Political Economy*, Vol. 94, No. 5, pp.1002–1037.

Rouach, D., and Santi, P. (2001). "Competitive Intelligence Adds Value: Five Intelligence Attitudes," *European Management Journal,* Vol. 19(5), pp. 552-559.

Salguero, G. C., Resende, P. C. Jr. and Fernández, I.A. (2017). "Proposal of an assessment scale in competitive intelligence applied to the tourism sector," *Journal of Intelligence Studies in Business*, Vol. 7(2), pp. 38-47.

Sewdass, N., and Toit, A. D. (2014). "Current State of Competitive Intelligence in South Africa," *International Journal of Information Management,* Vol. 34, pp. 185-190.

Søilen, K.S. (2017). "Why care about competitive intelligence and market intelligence? The case of Ericsson and the Swedish Cellulose Company," *Journal of Intelligence Studies in Business*, Vol. 7(2), pp. 27-39.

Strauss, A., and Corbin, J. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.

Streeten, P. F. (1998). "Globalisation: Threat or Opportunity," *The Pakistan Development Review,* Vol. 37(4), pp. 51–83.

Tao, Q., and Prescott, J. E. (2000). "China: Competitive intelligence practices in an emerging market environment," *Competitive Intelligence Review,* Vol. 11(4), pp. 65–78.

Todaro, M. P. and Smith, S. C. (2003). *Economic Development,* (8th Ed.). Singapore: Pearson Education.

Viviers, W. and Muller, L. (2004). "The evolution of competitive intelligence in South Africa: early 1980s–2003," *Journal of Competitive Intelligence and Management,* Vol. 2(2), pp. 53–67.

Viviers, W., Saayman, A. and Muller, M. L. (2005). "Enhancing a competitive intelligence

culture in South Africa," *International Journal of Social Economics,* Vol. 32(7), pp. 576–586.

Wilson, J. (1963/1987). *Thinking with concepts*, Cambridge, Cambridge University Press.

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Integration of textual VoC into a CX data model for business intelligence use in B2C

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ABSTRACT Customer experience (CX) focuses on customer feedback. CX is a holistic construct which contains different perceptual elements such as satisfaction and loyalty, but also emotions or personality. Customers share their opinions, which contain these elements also in textual expressions through different channels, known in research as Voice of Customer (VoC). Currently, VoC is collected mainly in customer surveys and manually evaluated, or through simple quantitative measurement from data scattered in various systems at the end of a customer journey. To bridge this gap, we designed a multidimensional CX data model for integrated storage of all customers' data from structured and textual sources. A consolidated CX measurement to monitor elements of CX during the entire customer journey from the customer perspective is proposed to serve as business intelligence. The artefact offers a self-contained expandable data mart affordable to implement in small and medium B2C enterprises. Companies can now manage customer relationships and future performance more automatically and effectively thanks to integrated information mined from texts, combined with other data from internal systems and shared across the company in unified reporting.

KEYWORDS Customer experience, data model, perceptual metrics, sentiment, voice of customer

1. INTRODUCTION

Customer experience (CX) can be understood in its holistic conception as a demonstration of experience through different elements, which originates in the customer. It encompasses cognitive, emotional, and social characteristics, as well as the user's quantitative interaction with the company (Verhoef et al., 2009) during the customer's entire purchase journey (Lemon and Verhoef, 2016). It is also an instrument to improve the value of the customer and the company. From the latter, it follows that the experience can be managed through the measurement of the elements connected as antecedents, succedents, or as parallel constructs to CX. These elements represent share-of-mind metrics, which are critical when managing to achieve better performance of an organisation.

The approaches for gathering data for CX are based mainly on the manual evaluation of questionnaires and surveys (e.g. Klaus and Maklan, 2013; Klaus, 2015; Khodadadi et al., 2016). Reading every text is time-consuming and resource-demanding (Nahili et al., 2019). In practice, the measurement of CX is currently dependent mostly on the evaluation of single metrics such as Net Promoter Score (NPS). These metrics are gathered with structured behavioural or transactional data as standalone quantitative indicators instead of metrics based on the text itself (e.g. Godes and Mayzlin, 2004; Liu, 2006; Wu and Zheng, 2012). The evaluators extract necessary data

from specific tools or analytical CRM (e.g. Aziza, Oubrich and Søilen, 2015).

CX management emphasises value creation. From a managerial perspective, firms should pay attention to textual content when managing CX and, more importantly, focus on the right measures. The value cannot be calculated merely from structured data as it is impossible to set the probability of a rise of such surprising information from VoC. Successful CX management needs to systematically collect VoC, mine that VoC for insights, share the insights with the business, and incorporate the insights into business decisions. That requires the ability to design, implement, and manage CX in a disciplined manner as a business intelligence (BI) solution. As is seen from the results of qualitative research in (Šperková, 2019), the most challenging for marketers is the synthesis of information from VoC into useful reports. The model targets this synthesis of the information to gain new insight into the CX.

There are many barriers to achieving the full potential of VoC analysis within CX, as the author identified in the previous qualitative research (Šperková, 2019) which can be overcome with the CX data model (missing shared VoC insights across the organisation, struggle to prove financial results, textual VoC is not well-analysed, fragmented view of the customer and missing integration of data, missing action with individual customers, missing formalisation of the processes).

Since the underlying data for CX measurement are located in different internal and external sources of the company, the examination of VoC for managing CX from one source only is incomplete. Companies should collect both qualitative and quantitative data from these sources to acquire a holistic view of CX. When accessing data from separate systems, end-users are not able to interconnect the data according to their identifiers or metadata and find valuable information about individual customers resulting from various customer data and VoC interconnections. End-users need to access the data from one integrated physical place stored in a unified form. The unified storage ensures the accuracy and reliability of the following measurement with minimal manual effort.

The proposed CX data model follows and builds on the author's previous research on the integration of VoC into BI in the banking domain (Šperková, 2014; Šperková and Škola, 2015a, 2015b; Šperková, Škola and Bruckner, 2015; Vencovský, Bruckner and Šperková, 2016). The model exploits data from analytical CRM. The aim is not a complex platform based on CRM but a self-contained expandable and transferable data model containing the data from textual VoC among other data, which can be implemented in any BI solution that is also affordable for small and medium enterprises (SMEs). SMEs have not fully adopted big data analysis systems (Gauzelin and Bentz, 2017) as such applications are not primarily accessible to them (Papachristodoulou et al., 2017). This solution can facilitate timely decision making based on CX and improve relationships with customers.

2. PROBLEM STUDIED

Measurements of CX lack clear definitions of the constructs and dimensionalities. Research emphasises the need for the development of robust metrics for the CX measurement (Verhoef et al., 2009; Jain, Aagja and Bagdare, 2017; Lemon and Verhoef, 2016; Zaki and Neely, 2019). Gupta and Zeithaml (2006, p.735) stressed "the need for more studies that view customer metrics comprehensively, rather than examining only a few constructs at a time". Many conceptual models were designed (e.g. Parasuraman, Zeithaml and Berry, 1988; Lemke, Clark and Wilson, 2011; Grewal, Levy and Kumar, 2009; Klaus, 2015; Lemon and Verhoef, 2016; McColl-Kennedy et al., 2018) with different dimensions of research; for comparison see Khodadadi et al. (2016) and Havíř (2017). Prior research has suggested that the customer's assessment of experience influences not only the single share-of-mind metrics such as customer satisfaction, customer loyalty or word-of-mouth, but also customer profitability and customer lifetime value (e.g. Bolton et al., 2004; Verhoef, 2003).

Organisations tend to measure specific aspects of the CX as customer perceptions for a single transaction at a point in time, or as an overarching perception. Customer satisfaction is the dominant customer feedback for measuring perceptions; however, it typically does not capture the full CX as it is concentrated at the end of the customer journey while ignoring the underlying issues and concerns resulting from the experience during the customer journey. The idea of measurement of overall CX at each stage of the customer journey for every touchpoint (Lemon and Verhoef, 2016) is still in an early phase of development. There is no agreement on robust measurement approaches, and no rigorous

assessment of metrics that should be collected has been developed to evaluate all aspects of CX across the customer journey (Lemon and Verhoef, 2016; Zaki and Neely, 2019). Existing scales (e.g. Brakus et al., 2009; Klaus, 2015) are aimed at specific research, and they are not understood as parts of the data model.

Researchers stress the importance of measurement of emotions, personality traits and sentiment detected in textual VoC as these CX elements accompany the customers' entire journey (Chen and Lin, 2015; Verhoef and Lemon, 2016; McColl-Kennedy et al., 2018). Personality, along with emotions, is a latent construct of CX. They are the main drivers of customer behaviour, and their determination can recognise behavioural patterns.

Research in service quality analyzes sentiment as an indicator of satisfaction based on text analytics. However, they focus only on the product/service/organisation perspective (Song et al., 2016; Palese and Piccoli, 2016; James et al., 2017; Vencovský, 2018; Farhadloo et al., 2016) rather than CX quality. The sentiment is aggregated for single products or product features, but it is not possible to map the sentiment back to the customer who wrote the comment. Customer perspective is neglected. When appraising an interaction, it is essential to evaluate the polarity of the interactions in a particular context – not only from the viewpoint of a marketing objective, but also the customer perspective – if the company wants to contribute to customer retention.

Customer reviews predominate as a dominant source of VoC. The evaluation of reviews is primarily performed with structured Likert-type scale ratings (Tsang and Prendergast, 2009) and assessment of their effects on purchase decisions with some research focus on sentiment (Zhang et al., 2016; Li et al., 2019). Although companies typically possess quantitative CRM data on customer buying habits and classifications, there is little knowledge about the personality and emotions of these customers and their evaluations. CX is more complicated than simple CRM metrics alone (Zaki and Neely, 2019). Information like opinions and emotions, but also personality, which cannot be found in transactional and other structured data, are partly hidden in customers' written expressions. Metrics should focus more on perceptions and attitudes to gain a comprehensive understanding of customers from their perspective.

Some researchers have built frameworks for automatic analysis of single sources of textual VoC data for BI purposes (Chau & Xu 2012; Peng et al. 2012; Yulianto et al., 2018), however without any context to structure data within the multidimensional data model.

Earlier, Yaakub et al. (2012; 2015) proposed an enhancement to the customer analysis multidimensional data model for the ontology model to calculate and analyse the opinion orientation of some groups of customers for products in certain levels based on the ontology gained from textual customer reviews. The customer analysis model designed by Yaakub (2015) represents the starting point for the CX data model in this article. Yaakub's research misses an integration with other structured customer data on an individual level, so the designed model stands alone without any context to other tables from the customer dimension. However, Yaakub emphasises the importance of the integration of the opinion from textual data with other customer structured data. This research extends the opinion fact table by adding emotions and personality traits linked to the customer dimension. The CX data model significantly expands on Yaakub's model by adding other tables with textual information and references to tables with the structural data from other sources. The CX data model results from the need for CX measurement. The artefact of CX measurements primarily builds on and extends the research in CX conducted by Lemon and Verhoef (2016) and Zaki and Neely (2019).

3. MINING THE CX ELEMENTS FROM THE TEXTUAL VOC

Customer's opinions play a significant role in CX. These opinions are contained in VoC and contain "sentiments, appraisals, attitudes, and emotions toward entities and their attributes expressed in a written text" (Liu, 2015). Analysing of VoC requires text analytics due to the textual expression. Text analytics characterises the content of the unstructured text by subject matter - major and minor topics and by positive and negative sentiment or emotions. The aim of this article is not to find the specific methods of analysing the text, but the way to store the information gained by these methods in a unified data model.

The opinion target is an entity which represents the object of the CX and its aspects described in the customer textual contribution (comment) as depicted in **Error! Reference**

source not found.. The elements of the CX then reflect perceptions of the opinion targets and are represented by:

1) **Sentiment** expressed about the target objects (positive, negative, neutral) and its intensity.
2) **Discrete emotions** expressed about the target objects (e.g. joy, sadness, trust). The text can be multi-emotional.
3) **Personality traits** of the customer who expressed the opinion (e.g. extroversion, neuroticism) can be determined from the overall expression of the customer. A customer is considered to have more than just one personality, so its intensity must be tracked.

The object can be a product or service, topic, event, person or an issue related to the product, service or company itself about how the customer expresses their opinion. The object can be discussed from different perspectives, which represent different aspects. These aspects can be product/service attributes (features), components, functionality or the dimensions of quality. For example, if the customer buys a sightseeing flight, the object is the *flight* itself, and aspects can be the *plane* comfortability, *price* the customer paid for the flight, *weather* on the day of the flight, or the satisfaction with the *pilot*. All these aspects the customer can evaluate with different words, some of which carrying the sentiment of appraisal words. According to Song et al. (2016), only the crucial aspects should be considered features or components.

Some aspects can be close to each other on the same topic and clustered together into a aspect category under one term. This step reduces the number of different aspects with the same informative value. The aspect category is typically more general than the aspect term itself and does not necessarily occur as a term in the text. For example, if the customer talks about the aspect category *weather*, she or he can use a sentence like "It was a beautiful sunny day without any clouds". The detected aspects are *sunny day* and *cloud*, and both terms fall under the aspect category *weather*.

For the purposes of CX measurements, satisfaction and expressed emotions about individual objects and their aspects are not only interesting but also the overall customer satisfaction. The customer can write many

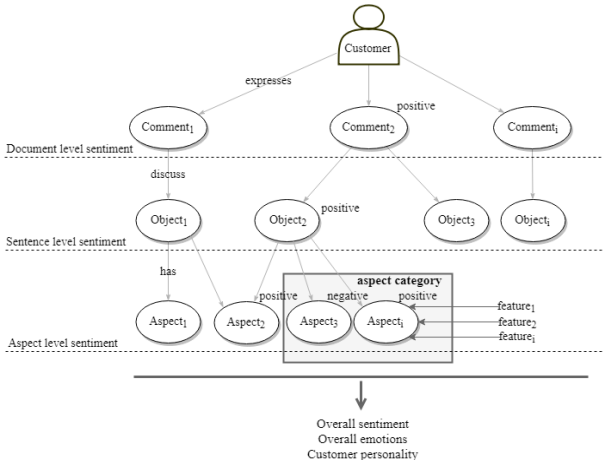

Figure 1 The parts of the VoC content from a single customer perspective.

comments; each comment contains opinions about different objects with several aspects. The sentiment and emotions are assigned to every aspect for every object in every subjective comment (if there is some detected). The object's sentiment is derived from the expressed aspects' sentiment; the comment's sentiment is derived from the sentiment of discussed objects in the comment. In other words, the overall satisfaction and expressed emotions are gained from the classification of the lower levels of analysis. This approach is consistent with the multidimensionality and enables us to add customer perspective to the CX with preservation of the product perspective by drilling and slicing at lower levels of granularity (for example to measure the average sentiment of a specific aspect of an object from the perspective of a chosen customer segment).

The personality traits are determined from all the comments the customer has written. More textual data ensures a better prediction of the personality. Determination of the emotional elements is possible only from the subjective and evaluative text with the emotional sentiment. The element of personality traits is also possible to determine from the text with a rational sentiment.

4. METHODOLOGY

The research is driven by the design science methodology (Wieringa, 2014). The solution design follows the preliminary research in CX and VoC.

Definition of CX measurement is based on a literature review, which puts existing constructs and metrics into mutual relationships and previous research (Šperková, 2019). Necessary metrics and

indicators to be followed by companies were detected in order to measure complex CX.

Design of metrics for CX measurement is based on customer sentiment, customer emotions and personality traits extracted from textual VoC by text analytics methods. The design respects the criteria for the application of text analytics methods to gain the necessary elements, and specifications of metrics and indicators are defined. The metrics are expressed from the BI perspective, according to Kimball et al. (2015).

Design of the multidimensional CX data model is enhanced with stored information extracted from textual VoC. The model respects the principles of multidimensional modelling (Inmon, 2002), and uses the unified modelling language (UML) class-based approach. Based on the target metrics, a method is suggested to store the underlying data for measurement and reporting of CX elements.

The architectural framework for the solution design is depicted in **Error! Reference source not found.**. The picture shows the integration process of textual VoC to the CX measurement from the data source collection to the reporting. The approach to the integration of textual VoC applies a textual extract/transformation/load (ETL) process onto the documents and extracts information as values of the entities and their attributes, as found in the text. Information is stored in the multidimensional model as structured data.

The process of integration requires more stages for the transformation of the data. Therefore, three stages were suggested as depicted in **Error! Reference source not found.**. First, the textual pre-stage stores the results from a pre-processing phase, which includes data cleaning and feature extraction and selection. These results serve as a data layer for content analysis. Second, the textual stage then stores information gained by text analytics methods above the content. And third, the analytical stage is then linked to the textual stage for the calculation of CX metrics as a logic layer of the BI. The analytical stage stores the structured customers' data with the results of analytical processes (such as data mining models) where CX elements are modelled based on the extracted information from textual data. The textual stage must be loaded first to fill tables in the analytical stage. The loading phase in the model is a part of the textual ETL. The highest layer of the framework is the access layer, which encompasses proposed metrics for reporting.

5. DESIGN OF CX MEASUREMENT

The proposal of the metrics represents the application of CX constructs (Parasuraman, Zeithaml and Berry, 1988; Lemke, Clark and Wilson 2011; Klaus, 2015; Lemon and Verhoef, 2016; McColl-Kennedy et al., 2018) with their constituent elements as the result of a thorough analysis of the current research in

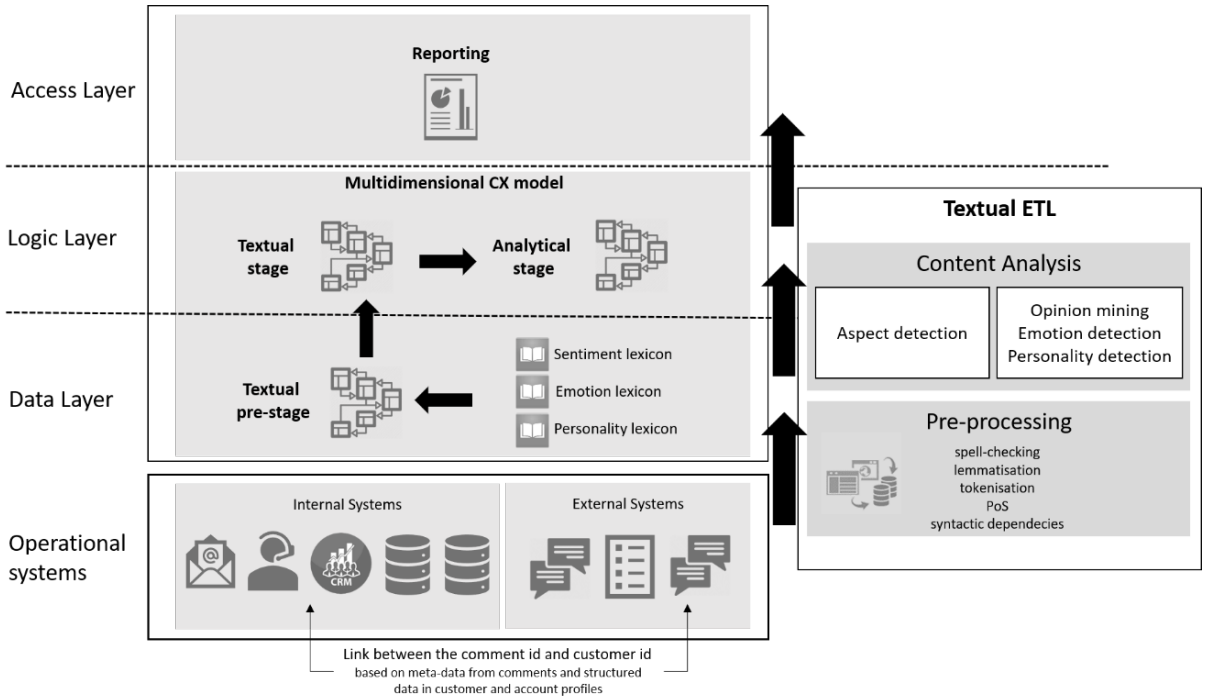

Figure 2 BI framework for the process of VoC integration to CX.

CX. The selection of the specific metrics and corresponding dimensions follows the literature review and the results of the quantitative research in Šperková (2019). During the interviews, the participants were asked which metrics and indicators are important for the monitoring and evaluating the CX in their organisations. The measurement is enriched for new elements of customer sentiment, customer emotions and personality traits.

Since CX is in this research assumed a customer perspective during their decision journey, the following metrics were suggested for measurement, to evaluate elements of CX from a customer perspective during the customer journey. The metrics evaluating CX from a company perspective are omitted as the goal is to get to the individual level of the customer. Metrics summarise various aspects of the data in the multi-level aggregated form and are comparable to the surveyed dimensions in the CX research.

The metric is understood as a quantitative or qualitative indicator or an evaluation criterion to assess the level of CX with its constituent elements. The primary purpose is to highlight the relevant facts that the company needs to address and improve the level of CX. The underlying data for the evaluation of the metrics are stored in the data model, which is designed for the querying in order to gain the metrics results. The metrics are supposed to be visualized in reports and dashboards: applications that organise metrics in a clear and intuitive graphical form for further managing CX. The metrics listed in Table 1 are designed on a general level as they can be customised according to the business and available data. The table contains the definition and construction of metrics and related CX elements which ensure a placing of the metrics into the CX construct.

Table 1 Metrics and indicators in CX measurement.

Metric/Indicator	**Definition/Construction/Sub-metrics**	**Related CX elements**
Customer Effort Score (CES)	Determines how much effort a customer has to exert to get a result (issue solved, request fulfilled, product purchased, question answered) on a scale from very easy to very difficult.	Engagement (cognitive); Satisfaction; Personality
Customer Satisfaction Score	Determines satisfaction on a scale from very unsatisfied to very satisfied.	Engagement (affective - intimacy); Satisfaction (evaluative)
Discrete Emotion	Detects customer's primary emotions according to the model of (Plutchik 1980): anger, anticipation, disgust, fear, joy, sadness, surprise, trust. Emotions can be enhanced for other from Plutchik's Wheel of Emotions.	Emotions; Satisfaction; Loyalty (attitudinal)
Emotional Value	Detects the emotional value based on detected emotions on the scale: strongly negative, negative, rational, positive, strongly positive.	Emotions
First Response Time	Calculates the average amount of time elapsed until initial response to the customer's contact according to the type of the contribution: comment type = complaint, suggestion, requirement	Satisfaction
Involvement level	Indicates the involvement level based on the following metrics: number of unique site visits, number of advertising impressions and clicks, number of website page views, time spent per session, time spent per page, number of in-store visits, number of newsletter subscriptions	Engagement
Net Promoter Score (NPS)	Determines detractors, promoters and passive customers. The indicator represents the answer to the question "How likely you would recommend company/product/service to a friend or colleague?" on a scale from 0 = very unlikely to 10 = very likely). Detractors, for a score of 0–6, passives, for a score of 7 or 8, promoters, for a score of 9 or 10.	Satisfaction (evaluative)
Number of cancellations	Indicates the number of cancellations the customer made (i.e. cancel an ordered service).	Satisfaction
Number of complaints	Indicates the number of complaints the customer sent to the company by a summary of individual comments with the type = complaint.	Engagement (cognitive - interaction); Emotions Satisfaction
Number of compliments	Indicates the number of compliments the customer sent to the company by a summary of individual comments with the type = compliments.	Engagement (cognitive - interaction); Emotions Satisfaction
Number of public comments	Indicates the number of public contributions by summary.	Engagement (affective - interaction); Loyalty (attitudinal)
Number of requirements	Indicates the number of suggestions the customer sent to the company by a summary of individual comments with the type = requirement.	Customer expectation; Engagement (cognitive - interaction); Emotions

Metric/Indicator	Definition/Construction/Sub-metrics	Related CX elements
Number of returns	Indicates the number of returns the customer made (for example to cancel the service).	Satisfaction
Number of suggestions	Indicates the number of suggestions the customer sent to the company by a summary of individual comments with the type = suggestion.	Engagement (cognitive - interaction); Emotions
Personality	A mixture of personalities values (openness, agreeableness, conscientiousness, extraversion, neuroticism) according to the Five-Factor model (McCrae and John 1992). Can be visualised as a radar graph.	Personality
Problem Resolution Time	Calculates the average amount of time for resolution of the customer's complaint: between when the customer first creates an issue ticket to when the issue is solved.	Satisfaction
Recency, Frequency, Monetary (RFM)	Determines: Recency – How recently made the customer purchase (interval between the time of the last transaction and first day of each season); Frequency – How often the customer purchases (number of days which occur a transaction during each season; Monetary – How much the customer spent (the average amount of money spent on purchases during each season). The result is the customer's placement in the cube according to binning the scores of frequency, recency and monetary into five equal frequency bins (Kohavi and Parekh 2004).	State in the Customer Journey; Engagement (interaction); Loyalty (behavioural)
Referral Value	Indicates the customer referral value by the following metrics: Reach: Number of impressions/responses/shares (forwarded content) to the customer's contributions; Sentiment of the responses to the customer's contributions; Importance of the responded contacts to the customer's contribution; Number of sent invitations to join the community by customer; Number of public contributions; Sentiment of the shared contributions	Sentiment; Engagement (affective - influence)
Review Score	Indicates the quality of the subject of consumption at a numerical scale.	Satisfaction (evaluative)
Sentiment	Calculates the sentiment of the customer contribution as a value to determine the polarity of the sentiment: positive, if sentiment value > 0, negative, if sentiment value < 0, neutral, if sentiment value = 0.	Satisfaction (emotional); Loyalty (attitudinal); Engagement (affective - intimacy)
Share-of-Wallet	Determines how much of available budget customer spent at the company versus competitors.Customer's total revenue/total spend x 100	Engagement; Loyalty (behavioural)
Value of Knowledge	Indicator of demanding (high value) and difficult customers (low value). Demanding: willing to participate in finding problem solutions. Difficult: requires energy on solving issues without the support of knowledge.	Engagement

In reports, metrics can be viewed from many dimensions, for immediate use in decision-making processes in the organisation. The examples of considered dimensions for filtering, slicing and drilling the metrics are defined in Table 2. The results of metrics can also act as dimensions to filter/slice/drill other metrics. For example, customer satisfaction is determined by customer *sentiment*. Customer sentiment can be assigned both to all the customer's comments as a summary sentiment and to a specific comment, object or aspect only. Further, sentiment can be used to slice the measurement of *most active customers* (determined by a number of comments posted by the customer) and show only those with negative sentiment polarity. All metrics are related to the time dimension, and the customer dimension as the measurement is aiming to the customer perspective. The values in dimensions (e.g. particular segments) can change according to stakeholders' needs.

The classification to the segments that can serve further as views to some metrics as dimensions can depend on results of other metrics. For example, the classification into loyalty segments depends on the results of the RFM score and engagement level (spreading positive WoM). The RFM score ascertains if the customer is still alive and makes purchases, but it may be that customer has not purchased for an extended period of time, but still talks positively about the company, thus spreading positive WoM. Such a customer would be in the loyalty matrix more in the left top corner as a latent loyal. The understanding of the causes of weak and negative attitudes in a customer can help companies identify barriers to purchase.

The definition of the segments and the borderlines between the segments depends on the business case and the goals of the company. The right segments should fulfil characteristics of similarity within the segments, differences between the segments, sufficient size of the segment and verifiability over time.

Table 2 Dimensions in CX measurement.

Examples of dimensions resulting from the data model	**Description**
Channel dimension	Stores the different modes for interacting with customers. Represents the source of data of VoC (e.g. review, email, post on a social network)
Customer dimension	Stores the static information about the customer
Object dimension	Represents the product, service, topic, issue, person or event represented as an object detected in the text
Aspect dimension	Represents the aspects of the object (dimension of quality, functionality, component) detected in text
Comment dimension	Detect type of the comment (complaint, compliment, suggestion, requirement, need)
Time dimension	Universal periods used throughout the model (year, quarter, month, week, date, datetime)
Sentiment polarity	Detect the polarity of the sentiment (positive, negative, neutral)
Loyalty segment	Determines customer loyalty based on a two-dimensional model of (Dick and Basu 1994). The result is the customer's placement in the matrix: *No loyalty* (low repeat purchases, weak relative attitude); *Spurious loyalty* (high repeat purchases, weak relative attitude); *Latent loyalty* (low repeat purchases, strong relative attitude); *Loyalty* (high repeat purchases, strong relative attitude)
Recency, Frequency, Monetary (RFM) segment	Determines the RFM segment based on the measured RFM score. The segments can be refined according to stakeholders' needs. *Loyal customer* (highest recency, highest frequency, highest monetary); *Potential loyal* (high recency, high monetary, more than one purchase); *New customer* (high recency, low frequency); *Attention seeker* (high monetary, high frequency, low recency); *Sleeping customer* (lower recency, lower frequency, lower monetary); *Lost customer* (lowest recency, lowest frequency, lowest monetary)
Customer state in the journey	Dimension extends the RFM result for other information gained about the customer. Detects the customer state in his/her customer journey according to Buttle and Maklan (2015): *Suspect*: potential customer fit the target market; *Prospect*: the customer fits the target market profile and is being approached for the first time; *First-time customer*: the customer makes the first purchase; *Repeat customer*: the customer makes an additional purchase.; *Majority customer*: the customer selects the company as a supplier of choice.; *Loyal customer*: the customer is resistant to switching suppliers and has a strong positive attitude to the company or offer; *Recovered customer* (customer who was considered as lost in last defined period, but purchased in the current period)

6. TEXTUAL STAGE OF THE CX DATA MODEL

The textual stage of the designed data model is a result of the textual ETL and can be divided into a textual pre-stage for results from pre-processing and a textual stage. In the pre-stage, the lexicons are stored for applications of models for content analysis or other data suitable for further processing. Among these lexicons are sentiment, emotion and personality lexicons for detection of these elements, but also domain ontologies for result refinement.

The results of text analyses are stored in the textual stage – sentiment, emotion, personality traits and opinion targets (objects and aspects), which further serve for measurement of CX elements in the analytical stage.

6.1 Input data

The customer interacts with the company and its other customers or prospects through different channels. An example of the process of collection of initial data from two different sources through web crawling and application interface is described in Šperková, Škola and Bruckner (2015). The data are transferred in a clearly defined format suitable for storage in the relational database. The input to the ETL process for the CX model is a structured table with all the raw interactions containing the opinions of the customers. Every single interaction is stored in the database under its identifier. The meta-data of one interaction represents one row in the table, including the raw text of the content. The input table contains at least these attributes:

- *Interaction identifier*: the unique identification of the interaction
- *Contributor identifier*: the unique identification of the user who expresses the comment

- *Source identifier*: the unique identifier of the source of the interaction
- *Timestamp*: the exact time the comment was sent or posted
- *Comment text*: the content of the interaction in plain text

Other attributes can be added (if any exist) containing additional information, for example, other contributors' identifiers, if the comment is accompanied by a rating in Likert-type scale or if the comments belong to different dimensions of experience.

The table stores the raw textual data prior to any text analytics processes, so it is always possible to return to the original text. Every comment discusses at least one target object (opinion target) and not all the target objects discussed in one comment must be correlated. In the textual stage, this table represents the table *Comment* in the model and can be completed by other transformed input data from different channels. The determination of the opinion target is a task for text analytics.

6.2 Pre-processing Phase

The pre-processing of the textual comments is based on a standard feature extraction and selection processes (Liu, 2015). The comments are spell-checked and parsed to sentences based on punctuation, tokenised and lemmatised. After tokenisation, the morphological tags (attribute *Morpho_Tag*) are assigned to the words and store to the relational table *Entity* (**Error! Reference source not found.**). The morphological tags are results of the morphological analysis, which works with isolated verbal forms, regardless of their context. Each tag is a string of 16 characters. Every position has its meaning. The first position determines PoS (N for noun, V for verb, A for adjective etc.), the second position contains the detailed determination of the word part. The 11th position determinates negation (Straka and Straková, 2018).

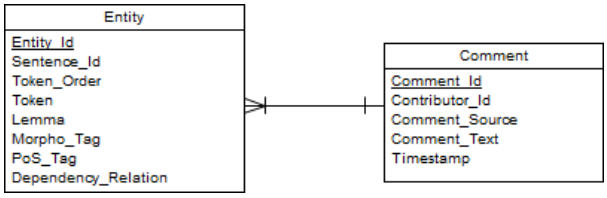

Figure 3 Relationship between the comment and entity tables.

To encompass entire phrases or n-grams in the text as subjects of mining methods (for example an aspect *wellness weekend*) and not only features represented by frequent nouns, adjectives and adverbs, the syntactic dependencies depicting opinion and target relations are also assigned (for example, with the Universal Dependencies treebanks) and stored in the column *Dependency_Relation*. The relational storage of a Czech sentence *"Flying a plane could be cheaper"* after pre-processing is depicted in Table 3.

The pre-processing phase of the textual data serves directly for the text analytics methods, and it is not critical to store the intermediate results to the database. Nevertheless, these results can serve for further improvement and adjustment of the methods or as a domain knowledge corpus which can be enhanced for other attributes, for example, entity type (number, person, organisation and similar) or even sentiment. Such results can be stored in a relational table, which has a relation to the transformed input table *Comment,* as demonstrated in **Error! Reference source not found.**. One comment contains many tokenised entities for the recognition of opinion targets and appraisal words in the next steps.

Only the opinion targets (objects and aspects) enter the next phase. Features and other words or phrases – which are representative words of aspects or appraisal words – do not enter the model. They serve only as evaluative words for the modelling of sentiment, emotions or personality traits. The aspect extraction is already a result of content analysis after pre-processing.

Table 3 Relational table with pre-processing results.

Comment_ Id	Sentence_ Id	Token_ Order	Token	Lemma	Morpho_Tag	PoS_Tag	Dependency _Relation
2899	4	1	Létání	létání	NNNS1-----A----	NOUN	nsubj
2899	4	2	by	být	Vc----------	AUX	aux
2899	4	3	mohlo	moci	VpNS---XR-AA---	VERB	root
2899	4	4	být	být	Vf--------A----	AUX	cop
2899	4	5	levnější	levný	AANS1----2A----	ADJ	xcomp
2899	4	6	.	.	Z:----------	PUNCT	punct

6.3 Conceptual Data Model of the Textual Stage

The textual stage represents the entities capturing the tacit knowledge available in textual comments. **Error! Reference source not found.** depicts the underlying conceptual model proposed to capture customers' opinions. The model shows only the necessary attributes for storing the textual data. The relation to ontology tables (emotion/personality/sentiment lexicons) and history tables is not depicted due to the readability of the model. For simplification, only concepts related to *object* and *aspect* are shown, as they are considered sufficient for the model's needs.

The model extends and builds on the knowledge of Yaakub (2015). The issue of Yaakub's model for opinion is that the fact table can store only one feature (aspect) per comment. This research adds the fact table *Opinion* into the conceptual model to gain a whole feature hierarchy.

In contrast to Yaakub's multidimensional model, the CX model needs to relate satisfaction and sentiment to relevant customers. Therefore, it is not sufficient to keep the sentiment value only for the particular aspect in the *Aspect* table, but it is needed to determine which customer holds this opinion as opinions differ from customer to customers.

In the conceptual model, the *Contributor* table as the contribution (comment) can also be written by a person who is not a customer of the company yet (i.e. potential customer or detractor). In a snowflake schema, it is possible to link the *Contributor* entity through the *Comment* table to the fact table *Opinion* and filter to the specific contributor. Then it is possible to find out the overall satisfaction of the contributor or their satisfaction with a particular comment, object or aspect.

The *Comment* class stores the full content of each customer's contribution, including the date when the comment was written. The source of each comment is stored in the class *Comment_Source* with values like 'email', 'call centre', 'social media', 'review' and similar. The *Comment_Type* determines the type of the comment based on the detected information in the text – whether it is a 'requirement', 'complaint', 'compliment', 'suggestion' or 'need'. If the comment is a review accompanied by the rating in a Likert-type scale, the attribute *Rating* gets its value.

Each *Comment* is written by a *Contributor,* and the relationship is many to one, as one contributor can write many comments. The

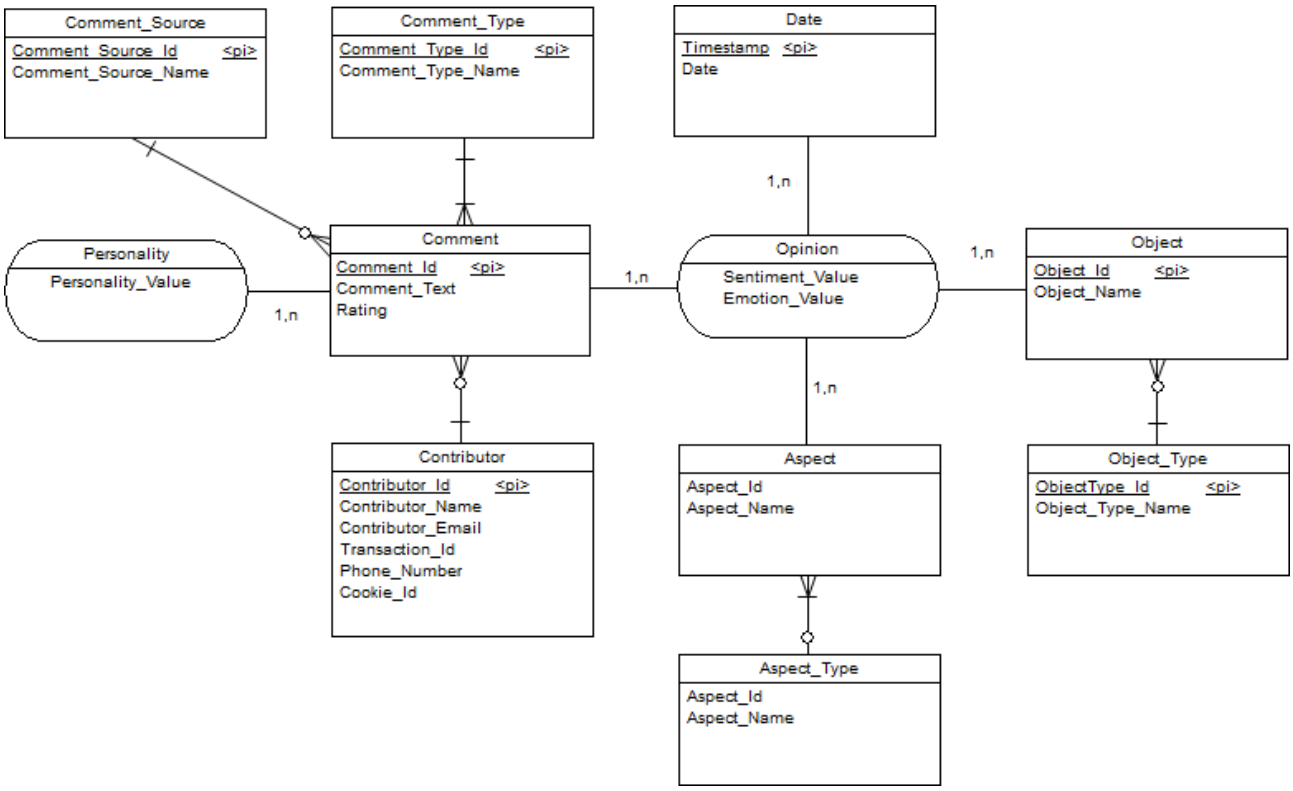

Figure 4 Conceptual model of the textual stage.

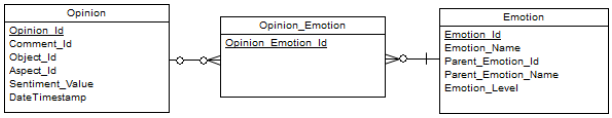

Figure 5 The m:n relation between opinion and emotion.

Contributor table comes with attributes identifying the contributor based on cookies, email, name, telephone number, transaction number or other identifiers which can distinguish the author of the comment based on meta-data gained from the comment. Since some comments are not tagged with customer or account identifiers, there is no direct way to link such comments with a particular customer or account in the database. During ETL, these attributes are further matched with existing information presented in the customer and account profiles, and the best match is then linked with the *Customer* table at the analytical stage. Contributors without a match get the attribute *Flag_Active* with the value 'non-active' in the *Customer* table. The linking of customer profiles with customer interactions is an essential step in ETL as it brings together the factual information about the customer gained from structured data with the factual information gained from the textual interaction used later in the CX data model.

The *Object* table stores the title of the discussed object. This table can represent any entity such a 'product', 'issue', 'service', 'event', 'person' determined in table *Object_Type*. The *Object* table allows the model to be multi-domain since it is possible to store comments on a wide range of topics.

The *object* can be recognised from the contribution based on the relation to the product/service it belongs to: metadata (i.e. review submitted to a particular product, an email regarding the product the customer purchased), the discussed domain or based on a dominant topic in the text. The *object* is represented by a finite set of its aspects $A = \{a_1, a_2, \ldots a_n\}$. A customer contribution (stored in the model in the *Comment* table) contains opinions about a finite set of objects {*o1*, *o2,* …, *ov*} and a subset of aspects of each object.

The m:n relation between the tables *Object* and *Aspect* replaces the idea that the product or service, which is the subject of the comment, is always classifiable into a hierarchy or family of products or services (Yaakub 2015; Lau et al. 2009). The basic idea of m:n relations between the tables *Object*, *Aspect* and *Comment* is that a negative comment about the object (product) does not mean that the customer gives a negative opinion on its aspects, or negative comment about the aspect, as this does not necessarily mean that whole comment is negative too. Also, the same aspect can be assigned to different objects (the aspect 'battery' is associated with both the object 'mobile phone' and object 'laptop'). If the statement does not mention any aspect at all (overall experience), then the evaluation stored in the table *Opinion* is assigned to the *object* in table *Object*.

The fact table *Opinion* contains the information detected by text analytics methods and transformed into structured data. The table contains an identifier to dimension tables *Comment*, *Object* and *Aspect* as the relation between these tables is m:n. The table stores the calculated *Sentiment_Value,* which serves in reporting for sentiment polarity determination:

- positive, if Sentiment_Value > 0,
- negative, if Sentiment_Value < 0,
- neutral, if Sentiment_Value = 0

If the *Sentiment_Value* of all objects and aspects in the comment is zero and no emotions are detected, the comment is considered rational. The attribute *Rationality_Flag* in the *Comment* table determines the character of the comment based on detected opinion – if the comment is 'rational' or 'evaluative'. The rationality is determined by detected emotions and sentiment in the text.

The *Opinion* table also contains flags for eight primary discrete emotions according to Plutchik (1980). If the model were expanded to more emotions from the Plutchik's Wheel of Emotions, the schema would have to change, and the relational table *Opinion_Emotion* would extend the model (**Error! Reference source not found.**) as the relation is m:n – one opinion can contain more emotions.

As personality detection is based on whole comments, the fact table *Personality* is related to the *Comment* table only. The detection of the personality traits depends on the expression as a whole and does not relate to an aspect or object. The table stores a calculated value for every personality trait according to the Five-Factor Model (McCrae and John 1992). The values are then aggregated on the customer level through related comments.

The *Date* table inserts the dynamic character of CX into the model and enables tracking information over time. *Timestamp* is an essential attribute for the reporting,

considering that a customer can have an inconsistent experience during the iterative customer journey. The *Personality* table is not linked to the *Date* table due to the assumption that the personality does not change with time. The personality prediction can be refined with additional textual data.

7. ANALYTICAL STAGE OF CX DATA MODEL

The analytical stage of the data model builds mainly on the knowledge of customer intelligence and exploits tables used in analytical CRM following the designed metric. The analytical stage modelled in **Error! Reference source not found.** as a physical model depicts the interconnection of the textual stage with the tables typical in analytical CRM (e.g. personal information, sociodemographic data, product preferences), but also with the tables resulting from other sources of EIS:

- transactional data (orders, sales, etc.)
- campaign data (campaign costs, budgets, plans from campaign management systems)
- web data (click-stream data and other data from web analytics platforms)
- results of data mining and other analytical processes as aggregated data (e.g. CLV).

-

These aggregated data serve as underlying data for metric reporting. For this reason, the data model is denormalised. The denormalisation also enables easier querying for analytical purposes. It is emphasised that not all tables are depicted in the model as the complexity changes based on available sources of data and elements detected in the text. The model can contain several dimensions depending on the granularity level of the measured CX. The model corresponds to a part of a complex analytical model, which is linked to several other entities. It provides a data mart for CX measurement, which can, in turn, be extensible for new entities and attributes. The model in **Error! Reference source not found.** presents the fact and dimension tables necessary for metric reporting with examples of attributes.

The display of relations to the *Timestamp* and *Date* dimensions are omitted to keep the clarity of the model. Only the relation between the *Opinion* fact table and the *Timestamp* dimension table are kept to demonstrate the time dimension of the model. In reality, all fact tables have links to the *Timestamp* or *Date* dimension table to ensure the history maintenance with snapshots and storage in historical tables.

The relationship to the dimension tables *Customer* and *Product* is depicted in the physical model. Since the table *Object* can represent any entity, such as a product or service, it is desirable to map values to the right tables according to the dimension table *Object_Type*. Following this information, the *Object* table has links to other appropriate tables. The mapping to the right object type is built on the similarity rules. If the value of the attribute *Object_Name* in the table *Object* is founded in the attribute *Product_Name* of the *Product* table, the row containing this value also gets the attribute *Object_Id* mapped to the *Object* table. The principle with other classes would be similar. Comparably, the *Aspect_Type* table determines the mapping of the *Aspect* table to other internal dimension tables.

The *Customer* table replaces the *Contributor* table from the textual stage, and the unidentified customers (contributors without a match) get the 'non-active' value to the attribute *Flag_Active* as such a contributor has not made a transaction with the company.

Except for the *Product* and *Product Category* tables, the analytical stage presented in **Error! Reference source not found.** expands the textual stage for other tables loaded from internal systems listed in **Error! Reference source not found.**.

8. IMPLICATIONS

The CX data model and the subsequent measurement bring significant benefits for CX measurement and management. The artefact mitigates the barriers in achieving the full potential of analysing VoC within CX, detected in Šperková (2019).

The model represents the application of the CX construct. The model brings a certain formalisation to CX measurement and management. The CX data model can help with a scope definition of measures needed to be monitored in a company.

The model enables the necessary integration of textual VoC from various channels and links this data to operational data, data from web analytics and other sources at one consolidated place accessible to all stakeholders. The model is extensible and transferable to any business environment. New entities, attributes and related metrics and

dimensions can always be defined. Connectors for new sources of data can be added.

The model is multidimensional and enables one to monitor elements from different viewpoints; dimensions allow querying specific subsets of data. Data which contain the specific forms of searched objects, aspects or comments are then displayed. The textual part of the model for storing the information from textual content leverages the use of insight gained from textual VoC within the share-of-mind metrics and significantly simplify the sharing of knowledge throughout the organisation. Thanks to dimensionality and collection of data across different touchpoints with the time dimension, the model enables one to measure the experience during the customer journey.

Due to the consistency with other trusted data in unified storage, the integrated data model guarantees higher credibility and accuracy of textual VoC and its subsequent measurement, which in the Internet environment may not be satisfied. Consolidation enables the reduction of random, time-consuming and error prone processes with less human effort, which is challenging to scale with the growing data. The connection to other financial data such as purchases, marketing costs, the performance of the channels and similar help to prove the financial results of CX actions.

The model reflects the customer perspective of the opinion target while the product perspective is not omitted. It is possible to aggregate the sentiment according to the particular object or aspect based on all comments from all customers who mentioned that aspect in these comments. The view on customers becomes unified, and their data stored in fine granularity at the individual level enables targeted one-to-one actions. The model enables employees to communicate with the customer consistently through all channels based on shared knowledge within the organisation.

Long-term monitoring of metrics within the consolidated reports allows finding patterns in CX and taking the corresponding approach or prevent certain situations. For business users, the reporting of metrics on dashboards brings the visibility and clarity of all monitored metrics and their instant overview of improving or deteriorating. The close co-operation of analysts and end-users is necessary. End-users must understand the essence of the metrics to be able to work with them correctly. This approach leads to continual improvement of CX and growth of

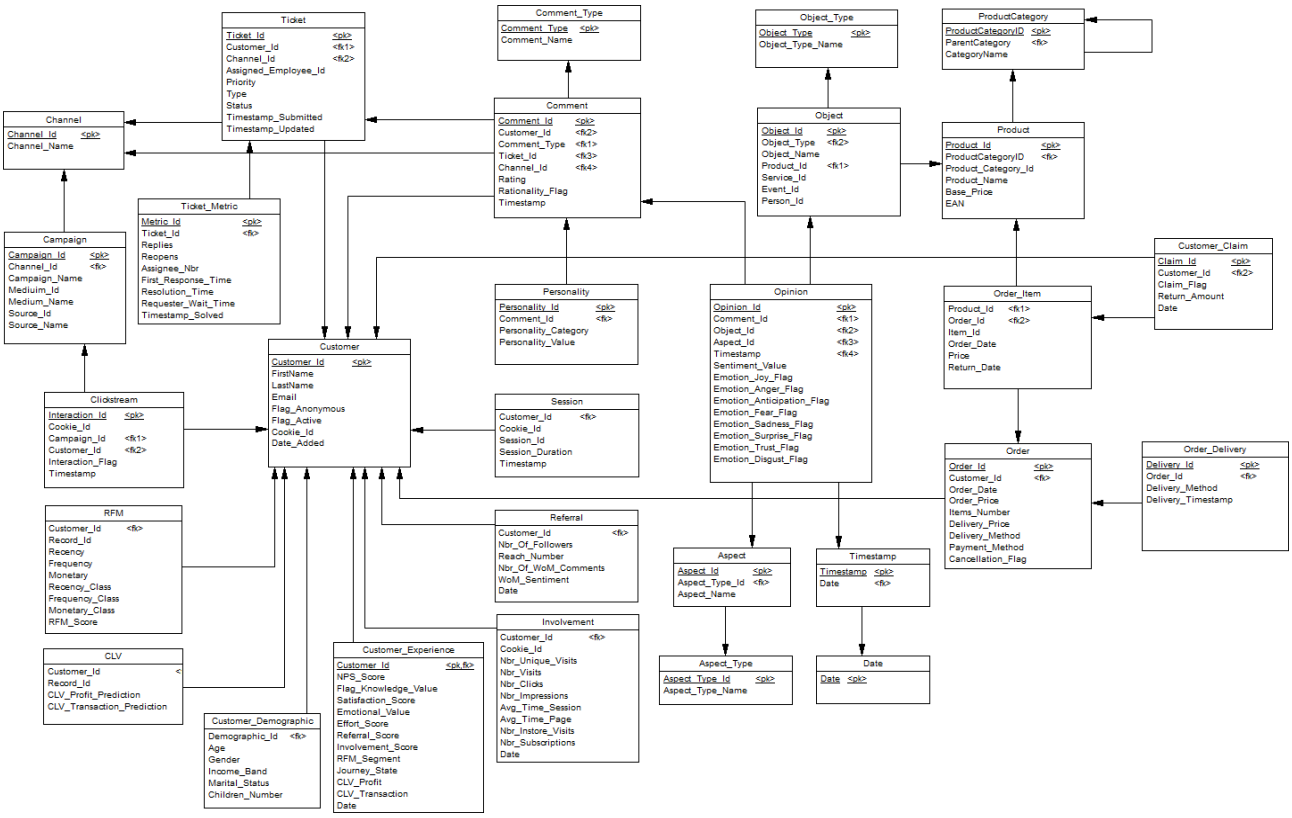

Figure 6 Physical model of the analytical stage of the CX data model.

agility, profitability and orientation to the customers.

Table 4 Tables added in the analytical stage.

Table name	Description
Channel	The Channel dimension table replaces the Comment_Source table from the textual stage. It contains all possible channels through customer interactions, not only with textual expression. This table represents the interconnection with other sources of the data.
Campaign	The Campaign dimension table extends the Channel for another granularity which represents campaigns the customer interacts through the web. The table can have foreign keys to tables Medium, Source, Placement or Banner depending on the granularity level. If it is possible to react to campaigns with textual data, the reference from the table Comment would be modelled.
Clickstream	The Clickstream fact table collects data from web analytics tools. It represents the interactions of individual cookies with individual campaigns. The attribute Interaction_Flag determines if the interaction was click or impression. If the Cookie_Id is recognised and linked to the Customer_Id, the reference with the Customer table is linked.
CLV	In the CLV fact table predictions are stored from the CLV modelling by different CLV models – the prediction of the transactions and profit for the next period for every customer.
Customer_ Claim	The Customer_Claim table stores the data about the customer's claims on purchased items. The Claim_Flag attribute determines if the claim is a replacement of the item, compensation or money return.
Customer_ Demographic	The table expands the table Customer for demographical data. This table serves for segmentation customers based on demographical data.
Customer_ Experience	The Customer Experience table serves for storage the results of different metrics or classifications to different segments which represent constituent elements of CX. For example, RFM_Segment is based on the results from table RFM. This table serves for easier querying to gain the results faster and preserving history values. Otherwise, these values can be found in other tables.
Involvement	The Involvement table stores the aggregated data from web analytics tools which serve as metrics. If the Cookie_Id is recognised and linked to the Customer_Id, the reference with the Customer table is linked.
Order	The Order fact table contains information about customer's orders. If the order was cancelled during the process of the purchase, the Cancellation_Flag gets the positive value. The table can contain many attributes regarding the prices, methods of payment, delivery and similar.
Order_Item	The Order_Item table represents items purchased within the Order. The table has a reference to the table Order. The attribute Return_Date represents the date of return if the customer returned the item. The table can have many attributes with references to additional tables like Service, if the item is coming with additional services.
Order_ Delivery	The Order_Delivery table stores the information about the timestamp when the order was delivered to the customer. Based on this information, the average time of delivery can be measured.
Referral	The Referral table stores aggregated data from social networks analysis as metrics.
RFM	The RFM table stores the information for RFM calculation – frequency, recency. Monetary values together with the assigned bin and segment. This table is a result of calculations and modelling based on the table Order.
Session	The Session table is based on data from web analytics tools and stores the information about the customer's visits on the company's websites. If the Cookie_Id is recognised and linked to the Customer_Id, the reference with the Customer table is linked.
Ticket	The Ticket table represents the customer's claim, requirement, need or complaint submitted to the company. The ticket can be composed of a thread of comments. The table has a reference to the Channel table, representing the channel through the customer submitted the ticket; the Assigned_Employee_Id can represent the foreign key to the Employee table (not shown in the model). The Timestamp_Submitted shows the time when the ticket was sent to the company and Timestamp_Updated records every update in the ticket.
Ticket_ Metric	The Ticket_Metric table serves for a calculation of metrics based on the information from attributes of the Ticket table. The table records number of replies to every ticket (number of comments), number of reopens, how many employees were assigned to the ticket till his solution, the time the customer had to wait to the first response to the ticket is stored in First_Response_Time, the Resolution_Time stores the total time from the first contact to the solution of the ticket. Requester_Wait_Time records the total time the customer spent waiting for the response.

9. CONCLUSION

The designed CX data model represents the application of CX constructs from previous research. The data model can be understood as a data mart of the data warehouse. The model builds on the knowledge from the customer analysis model designed by Yaakub (2015). It is divided into textual and analytical stages, where the analytical stage is dependent on results from the textual stage. The metrics are expressed from the BI perspective based on dimensional modelling as indicators and their characteristics, analytical dimensions and their characteristics, and the relationship between dimensions and indicators. The elements of emotions, sentiment and personality traits are automatically detected from textual VoC data with text analytics methods, which are the subject of further research. The mined information is joined with other operational, transactional and behavioural structured data from various systems in the unified multidimensional data model.

The artefact solves the complexity of understanding the customer base by implementing a sophisticated data-driven approach to the comprehensive measurement of overall customer experience. The collection of all customer data from multiple channels, with which the customer interacts during their journey, into singular storage with unified access enables one to look at all customer data from the customer perspective according to the time dimension and evaluate their experience in a timely manner and their state in the journey. The artefact brings customer experience measurement to a new level of customer insight which drives loyalty across different channels. This contributes to retention marketing efforts in companies and provides a direct customer-oriented approach, replacing mass marketing conducted on aggregated data.

The aim of further research is to implement this CX data model and measurement in different business domains to validate its usefulness and portability in practice. The development of the application based on the artefact that enables collaboration, management of marketing activities, or alerting can also be a topic for further research.

10. REFERENCES

Aziza, A., Oubrich, M., & Søilen, K. S. (2015). The impact of CRM on QoE: An exploratory study from mobile phone industry in Morocco. *Journal of Intelligence Studies in Business*, *5*(2).

Bolton, R. N., Lemon, K. N., & Verhoef, P. C. (2004). The theoretical underpinnings of customer asset management: A framework and propositions for future research. *Journal of the Academy of Marketing Science, 32*(3), 271-292.

Brakus, J. J., Schmitt, B. H., & Zarantonello, L. (2009). Brand experience: what is it? How is it measured? Does it affect loyalty? *Journal of marketing, 73*(3), 52-68.

Buttle, F., & Maklan S. (2015). *Customer relationship management: concepts and technologies*. Third edition. Routledge.

Chau, M. & Xu, J. (2012). Business Intelligence in Blogs : Understanding Consumer Interactions and Communities. *MIS Quarterly*, 36(4), 1189–1216.

Chen, S. C., & Lin, C. P. (2015). The impact of customer experience and perceived value on sustainable social relationship in blogs: An empirical study. *Technological Forecasting and Social Change, 96*, 40-50.

Farhadloo, M., Patterson, R. A., & Rolland, E. (2016). Modeling customer satisfaction from unstructured data using a Bayesian approach. *Decision Support Systems, 90*, 1-11.

Gauzelin, S. and Bentz, H. (2017). An examination of the impact of business intelligence systems on organizational decision making and performance: The case of France. *Journal of Intelligence Studies in Business*, *7*(2).

Godes, D. & Mayzlin D. (2004). Using Online Conversations to Study Word-of-Mouth Communication. *Marketing Science*, 23(4), 545-60.

Grewal, D., Levy, M., & Kumar, V. (2009). Customer experience management in retailing: An organizing framework. *Journal of Retailing, 85*(1), 1-14.

Inmon, W. H. (2002). *Building the Data Warehousing*.

Gupta, S., & Zeithaml, V. (2006). Customer metrics and their impact on financial

performance. *Marketing science*, *25*(6), pp. 718-739.

Havíř, D. (2017). A comparison of the approaches to Customer Experience Analysis. *Economics and Business*, *31*(1), 82-93.

Jain, R., Aagja, J., & Bagdare, S. (2017). Customer experience–a review and research agenda. *Journal of Service Theory and Practice*, *27*(3), 642-662

Khodadadi, P., Abdi, F., & Khalili-Damghani, K. (2016). An Integrated Model of Customer Experience, Perceived Value, Satisfaction, and Loyalty in Electronic Stores. *International Journal of Enterprise Information Systems (IJEIS), 12*(4), 31-46.

Kimball, R., Ross, M., Mundy, J., & Thornthwaite, W. (2015). *The kimball group reader: Relentlessly practical tools for data warehousing and business intelligence remastered collection*. John Wiley & Sons.

Klaus, P. (2015). *Measuring customer experience: How to develop and execute the most profitable customer experience strategies*. Springer.

Klaus, P., & Maklan, S. (2013). Towards a Better Measure of Customer Experience. *International Journal of Market Research, 55*(2), 227–246.

Lau, R. Y., Lai, C. C., Ma, J., & Li, Y. (2009). Automatic domain ontology extraction for context-sensitive opinion mining. *ICIS 2009 Proceedings*, 35-53.

Lemke, F., Clark, M., & Wilson, H. (2011). Customer Experience quality: an exploration in business and consumer contexts using repertory grid technique. *Journal of the Academy of Marketing Science*, *39*(6), 846-869.

Lemon, K. N., & Verhoef, P. C. (2016). Understanding customer experience throughout the customer journey. *Journal of Marketing*, *80*(6), 69-96.

Li, X., Wu, C., & Mai, F. (2019). The effect of online reviews on product sales: A joint sentiment-topic analysis. *Information & Management*, *56*(2), 172-184.

Liu, B., 2015. *Sentiment analysis: Mining opinions, sentiments, and emotions*. Cambridge University Press.

Liu, Y. (2006). Word of mouth for movies: Its dynamics and impact on box office revenue. *Journal of marketing*, *70*(3), 74-89.

McColl-Kennedy, J.R., Zaki, M., Lemon, K.N., Urmetzer, F. and Neely, A. (2019). Gaining customer experience insights that matter. *Journal of Service Research*, *22*(1), 8-26.

McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of personality, 60*(2), 175-215.

Nahilia, W., Rezega, K., & Kazara, O. (2019). A new corpus-based convolutional neural network for big data text analytics. *Journal of Intelligence Studies in Business*, *9*(2).

Papachristodoulou, E., Koutsaki, M. and Kirkos, E. (2017). Business intelligence and SMEs: Bridging the gap. *Journal of Intelligence Studies in Business*, *7*(1).

Parasuraman, A., Zeithaml, V. & Berry, L. (1988). SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality, *Retailing: critical concepts*, 64(1), 140.

Park, B. K., & Song, I. Y. (2012). Incorporating Text OLAP in Business Intelligence. In *Business Intelligence Applications and the Web: Models, Systems and Technologies*, 77-101.

Peng, W., Sun, T., Revankar, S., & Li, T. (2012). Mining the "voice of the customer" for business prioritization. *ACM Transactions on Intelligent Systems and Technology (TIST)*, *3*(2).

Plutchik, R. (1980). Emotion: A Psychoevolutionary Synthesis, Harper and Row. *New York.*

Šperková, L., 2014. Word of Mouth analysis on facebook in banking. In: *Marketing identity*. Smolenice, pp. 236-252. Trnava: Univerzita sv. Cyrila a Metoda v Trnava.

Šperkova, L., 2019. Qualitative Research on Use of Voice of Customer in Czech Organisations. *Journal of Systems Integration*, *10*(2), pp.9-18.

Šperková, L. and Škola, P., 2015, September. Design of Metrics for e-Word-of-Mouth Evaluation From Unstructured Data for Banking Sector. In *European Conference on Knowledge Management* (p. 717). Academic Conferences International Limited

Šperková, L., & Škola, P., 2015. E-WoM Integration to the Decision-Making Process in Bank Based on Business Intelligence. *Proceedings of the 23nd Interdisciplinary Information Management Talks*, pp. 207-216. Springer.

Šperková, L., Škola, P. and Bruckner, T., 2015. Evaluation of e-Word-of-Mouth through Business Intelligence processes in banking domain. *Journal of Intelligence Studies in Business*, *5*(2).

Tsang, A. & Prendergast, G., 2009. Is a 'star' worth a thousand words? *European Journal of Marketing*, 43, 1269–1280.

Verhoef, P. C. (2003). Understanding the effect of customer relationship management efforts on customer retention and customer share development. *Journal of Marketing, 67*(4), 30-45.

Verhoef, P. C., & Lemon, K. N. (2016). Advances in customer value management. *Handbook of Research in Relationship Marketing*, 75-103.

Verhoef, P. C., Lemon, K. N., Parasuraman, A., Roggeveen, A., Tsiros, M., & Schlesinger, L. A. (2009). Customer experience creation: Determinants, dynamics and management strategies. *Journal of retailing*, *85*(1), 31-41.

Wieringa R. (2014). *Design science methodology for information systems and software engineering.*

Wu, W., & Zheng, R. (2012). The impact of word-of-mouth on book sales: review, blog or tweet?. In *Proceedings of the 14th Annual International Conference on Electronic Commerce,* 74-75.

Yaakub, M. R. (2015). *Integration of opinion into customer analysis model*. PhD thesis. Queensland University of Technology.

Yaakub, M. R., Li, Y., Algarni, A., & Peng, B. (2012). Integration of opinion into customer analysis model. In *Proceedings of the The 2012 IEEE/WIC/ACM International Joint Conferences on Web Intelligence and Intelligent Agent Technology, 03,* 164-168.

Yulianto, M., Girsang, A.S. and Rumagit, R.Y. (2018). Business intelligence for social media interaction in the travel industry in Indonesia. *Journal of Intelligence Studies in Business*, *8*(2).

Zaki, M., & Neely, A. (2019). Customer Experience Analytics: Dynamic Customer-Centric Model. In *Handbook of Service Science, Volume II.* 207-233.

Zhang, X., Yu, Y., Li, H., & Lin, Z. (2016). Sentimental interplay between structured and unstructured user-generated contents: An empirical study on online hotel reviews. *Online Information Review, 40*(1), 119-145.

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How competitive intelligence can be used to improve a management vocational high school: A case from Indonesia

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ABSTRACT Vocational high school needs professional management in order to increase competitiveness. This requires easy, efficient and comprehensive management techniques to maximize potential. The purpose of this study is to improve vocational high school competitiveness by applying competitive intelligence methods. This study uses competitive intelligence methods that are divided into two steps: the competitive intelligence circle in formulating problems and the competitive framework of intelligence as a management model. The results of this study show that problems can be mapped using different competitive intelligence tools. The use of a competitive intelligence framework produces a prime management model and strategies. This applied framework enhances the competitiveness of the vocational high school in our case.

KEYWORDS Competitive intelligence, management, vocational high school

1. INTRODUCTION

Vocational high schools are primary producers of workers in developing countries. This skilled labor industry is needed in developing countries to supply laborers for industries and other sectors that need skilled labor. Schools should produce professionals that are instructed by teachers who are professionals in their fields [1]. It takes a superior vocational high school to realize this goal, which shows it is a quality school. The characteristics of quality are high competitiveness and strong competitive advantage. Another feature is that vocational high schools can provide public education and training services for students. The Indonesia Central Bureau of Statistics shows that there are 13.68 million people, making up 11.03% of the skilled workforce, that came from vocational high schools in 2018 [2]. The data are an increase from the 2017 numbers, which show only 10.40% of the workforce came from these schools. The majority of graduates from vocational high schools work as employees at a company (49.23%), 23.62% are self-employed, and the rest are in other jobs. Based on the field of work, the majority of workers (56.84%) work in the informal sector. On the income side, the average vocational high school graduate receives a wage of IDR 2.23 million. This shows that the majority of vocational high school graduates do not work in relevant jobs and are instead working according to the opportunities available at that time. The unemployment rate in 2018 is dominated by vocational high school graduates, making up 11.24% of the 7 million people who are unemployed nationally in Indonesia [3].

These data indicate that the competitiveness of vocational high schools is

still low in order to be able to compete in the fields studied at the school. A school management model is needed which is directed at increasing competitiveness [4]. Good managerial skills influence schools in managing their resources and opening up opportunities for stakeholders. Technology will make schools more competitive [5]. This management is not only limited to the school curriculum and human resources available, but also complete and massive complete management. This study aims to improve the competitiveness of vocational high schools and is supported by applying competitive intelligence. This research is expected to produce a way to improve the competitiveness of vocational schools that are significant and able to improve the management of vocational secondary schools professionally.

2. LITERATUR REVIEW

Competitive intelligence encourages competition to utilize all the resources needed to win the competition by paying attention to its competitors [6]. Related to that, competitiveness can be increased by overcoming the shortcomings raised and being prepared for each challenge that arises. In order to be more competitive, you can also use other competitive model tools [7]. Institutions can use information technology to build strength and take advantage of the opportunities they have [8]. Information technology support enables vocational schools to reach an agreement and increase competitiveness. Technology has become a driving force for vocational high schools that provide high-quality training [9]. Information technology can be used as the main enabler for all business processes that it has. Information technology has encouraged vocational secondary schools in a fast and unlimited era of globalization [10]. There is support for information technology as an enabler, a finding that can be achieved in a way that is easily obtained from the results, with highly competitive power in accordance with industry and society.

The competitive method of intelligence with the support of information technology will produce quality graduates. Therefore, vocational high schools needs to make improvements in terms of professional human resources [11], reliable management, quality teaching and learning activities, access to quality domestic and foreign higher education institutions and the availability of equal

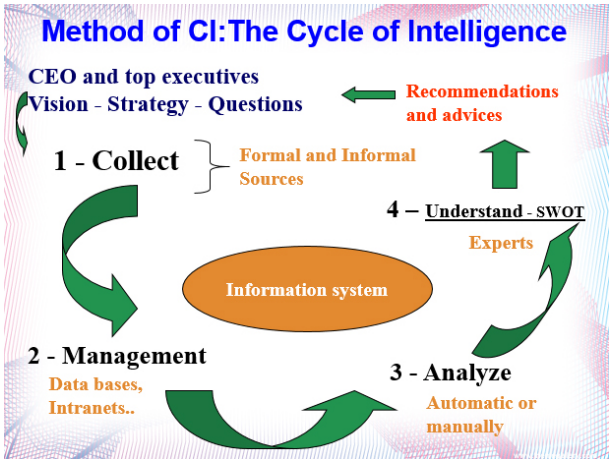

Figure 1 Competitive intelligence method.

facilities with international standard education [12]. The increasingly difficult challenge in the world of education, especially for planning and management, education policymakers, is that, in this case, the government must have a tool or device to evaluate the extent to which education development, especially the performance of educational services for the community can be achieved [13]. The best way to ensure an organization (school) has the durability and viability of the present and sustainability in the future is to create a new strategy using several analyses, such as SWOT analysis, Potter five force analysis, key of success analysis or analysis patent.

A SWOT analysis of factors determines all systematic factors to formulate organizational strategies for both business enterprises and social organizations [14]. Strength analysis can maximize strength (opportunity), opportunity (weakness) and weakness (threat). Strategic decision-making processes consider the vision, mission, goals, and policies of an organization. Thus the strategic planner (strategic factor) must analyze the organizational strategy factors (strengths, weaknesses, opportunities, and threats) in the current conditions [15]. Five forces Porter's analysis is a simple but very useful tool for where the strength of our company lies in competition in the business world [16]. By using this five strength analysis, we can find the current competitive position and position competition in businesses that are fighting. The key success factor (KSF) was the implication of the process of matching the company, which was used to support the company's internal factors. The KSF has the potential to gain a competitive advantage in a particular industry, especially in matters that

are important for companies and who challenge successful companies [17]. Analysis of intellectual property rights (IPR) is divided into two types: copyright and industrial property rights. Based on Indonesian Law Number 19 of 2002 concerning Copyright, Copyright is the exclusive right for the Creator or the right to announce or reproduce work permissions for it by not allowing it to improve with the regulations requested [16]. Industrial property rights are based on patents, brands, industrial designs, layout designs of integrated circuits, trade secrets, and plant varieties.

3. METHOD

This research was conducted by collecting formal and informal data. Formal data is obtained from various scientific sources such as school performance reports, scientific journals, and books. Informal data is obtained from various observations of the institution, surveys, and interviews with respondents. This data collection contains human resources, learning methods, achievements, financial data, and school curriculum data. Data is collected from direct observation and interviews with school principals, teachers, students, and school administrators.

The method of research is a competitive intelligence method which is divided into two main steps: a competitive intelligence circle in formulating the problem and an intelligence framework as a management model. This study uses SWOT analysis to produce a competitiveness strategy, and the researchers used competitive intelligence analysis techniques as shown in Figure 1.

Competitive intelligence methods start with the question of how the company vision can be realized with the best strategy. Thus the three basic questions are asked, namely: Where are we now? Where do we want to go? and How do we get there? The competitive intelligence method will formulate a four-step company strategy as shown in Figure 1. The first step is to gather information from various sources, both formal and informal. The second step is management. The information should be managed successfully in the form of databases and intranets so that it is easy to analyze. The third step is analysis. The information is analyzed both automatically and manually with various tools available. The result of this process is a strategy. The fourth step, is to understand. The results of the analysis are then extracted into a strategy that will be applied as a way to increase competitiveness. The results of the strategy are then recommended to the CIO and top executives as a strategy that will be implemented to achieve the company's vision.

4. RESULT AND DISSCUSION

4.1 Profile: Indonesian Vocational High Schools

The average vocational high school vision covers a certain period of time. In the vocational high schools that were sampled, they have a vision of "being a faithful vocational secondary school, being honest, courteous, intelligent, cultured, achieving, disciplined, diligent, nationalist and holding on to Pancasila and the 1945 Constitution". This vision is still difficult to realize. While its mission is, 1) educate and train students to be safe and polite, 2) educate and train students to be smart and trained in the fields of nursing, pharmacy, automotive, and graphics preparation, 3) educate, train and encourage students to be able to perform according to competence, 4) educate and train students so that they can be diligent, faithful, national, based on the Pancasila and the 1945 Constitution.

Vocational high schools require buildings, facilities, teachers, administrative staff, and all students need to be improved and developed. The location is supportive to improve the learning process. Schools have a principal, deputy principal, teachers, employees, students and also school guards/security guards. The conditions for productive learning are sufficient to carry out vocational learning.

The learning process uses guidelines that are in accordance with the government-determined curriculum. There are two curricula that are applied in vocational high schools: the 2013 Curriculum for Class X and KTSP 2006 for class XI & class XII. The school curriculum is a series of activities arranged in accordance with the needs of the school carried out in vocational high schools. The curriculum includes the division of teachers' tasks, preparation of lesson schedules, preparation of learning units, preparation of KBM tools, implementing the teaching learning process (KBM) and evaluation. Second, extra-curricular programs include: homework (development of learning materials), sports and competitions, line training, worship, regional arts training, skills, arts and scouts. This has an impact on students because

students no longer accept material that can be understood.

Financial requirements are met as all vocational secondary schools receive funding from the government in accordance with the number of students approved at the school. In addition, sources can also be obtained from subcommittee payments with fees determined by the school. From these various sources, vocational secondary schools are able to finance all costs obtained in school management. The school is able to manage various things to realize its vision, be able to survive and be able to compete well.

4.2 SWOT Analysis of Vocational High Schools

SWOT analysis is used as a basis for discussing work strategies and programs. An assessment of the factors of strength (weakness) and weakness (weakness). Meanwhile, external analysis limits opportunities (challenges) and challenges (threats). There are two types of information that are equipped with boxes, namely the top two are external factor boxes (opportunities and challenges). The two adjoining boxes are internal factors (strength and weakness). The other four boxes are boxes of strategic issues that emerge as a result of points related to internal and external factors (Figure 2).

EKSTERNAL / INTERNAL	OPPORTUNITY	TREATHS
STRENGTH	*Comparative Advantage*	*Mobilization*
WEAKNESS	*Divestment/Investment*	*Damage Control*

Figure 2 Matrix SWOT Kearns.

Table 1 Result of the SWOT analysis of a vocational high school.

	OPPORTUNITY	**THREAT**
External Factor	1. Local government assistance in completing facilities & infrastructure 2. Demands from the surrounding community for a quality collection 3. Parental support	1. Similar educational institutions 2. Progress on health & automotive technology 3. Competition to enter vocational school
Internal Factor	4. Get support from BOS funds from the government	
STRENGTH 1. Having a student teacher who is confirmed and obeyed by students 2. The motivation of teachers & students 3. Student's scare, they still have a good relationship with the teacher 4. The learning process is done adjusting to the circumstances & willingness of students	**STRATEGY** **Strength- Opportunity** 1. Continue to motivate teachers & students in teaching and learning with government support in completing infrastructure facilities 2. Doing learning for students by applying interesting learning methods and having optimal learning outcomes.	**STRATEGY** **Strength-Threat** Work to improve what must be the best in all fields, both teachers and students in the context of competition with other schools
Weakness 1. The salary of the teaching staff is too small 2. Does not have complete learning facilities 3. Does not have complete laboratory facilities 4. Most teaching staff cannot overcome student delinquency 5. There is a no teacher acceptance test 6. There is a no student acceptance test 7. Only 1 teacher is a civil servant, the rest are honorary teachers 8. Most teaching staff are not in accordance with teaching time 9. School buildings need a lot of improvement 10. School equipment is old and needs to be replaced	**STRATEGY** **Weakness- Opportunity** 1. Increase the wages of the teaching staff, so that the teaching staff will become more professional and succeed maximally by using government assistance 2. Replacing & repairing school equipment with government assistance 3. Facilitating laboratories with government assistance 4. Trust 1 staff for school finance 5. Utilizing improvement support with joint service work to improve the school building 6. Submit requests to the government to procure qualified teaching staff	**STRATEGY** **Weakness-Threat** 1. Receiving teaching staff by conducting tests according to their respective fields, especially teaching the staff of productive subjects 2. Accept students' test so that each student enters guaranteed quality and character 3. Conduct special training for teaching staff 4. Conduct character coaching for students 5. Conduct a joint evaluation every week to discuss learning methods & integration of teaching staff as well as everyone involved in the school

In Figure 2, Cell A is the comparative advantage where you can develop faster. Cell B is mobilization, where the cell is the interaction between threat and strength. Here, resource mobilization must be carried out, which is the strength of the organization to be the threat from outside, the event then turning the challenge into an opportunity. Cell C is divestment/ investment. This cell is an opportunity between organizational weaknesses and opportunities from outside. A situation like this provides an option for an escape location. The opportunities available are guaranteed but cannot be used because of insufficient strength. The choice of a decision taken is issuing opportunities available for other organizations to use or forcing them to work on opportunities (investment). Finally, Cell D is control damage, This is the weakest condition of all cells because it is a meeting between the weaknesses and the resolution of decisions that will bring a great disaster to the organization. The strategy of returning losses is so that it doesn't become more severe than expected.

The results of SWOT analyses are possessed by vocational high schools. On the external side, there are many opportunities that can be maximized by vocational secondary schools, but there must also be questions about the challenges that arise in competition (Table 1).

Some of the strong strategies that need to be built in vocational high schools are conducting innovative learning using various project-based learning methods, based on problems, learning to find discoveries and other students who take more and increase higher interest. A targeted apprenticeship program and appropriate scientific competition can also be applied in the step of increasing the competitiveness of secondary school graduates. The internal strategy that can be applied is the improvement of visionary leadership patterns and strong and resilient managerial capabilities. Vocational secondary school is supported by leaders who drive competition, develop good technology, have strong leadership abilities and are able to move all the components in front. Calculated strategies can maximize organizational strength. In addition, organizations also need special attention. Calculated strategies are needed to reduce and overcome organizational weaknesses. For example, a strategy to get new students who are qualified and meet basic standards for vocational school students is needed.

External-based strategies must be built on the strengths of the organization. Vocational high schools must formulate strategies to take advantage of their competitors. This strategy must be solved by considering the strategies that can be generated after making a strategy. Continuous evaluation is needed to develop a strategy that is sustainable over a long period of time. Vocational high schools need to carry out strategies to implement sustainable service improvements for the provision of quality services available in the long term. The strategies needed for invitation requirements arise. This threat can come from other competitors, regulatory changes and social events phenomena that arise in the community. This is a strategy to anticipate. One strategy that can be applied is to increase the human resources needed. Competent human resources can significantly improve the competitiveness of secondary schools so they are able to compete with various challenges.

5. CONCLUSION

Strong competitiveness can be built with strategies that are good and feasible to implement. Competitive intelligence techniques are proven to be able to significantly improve the competitiveness of vocational high schools, in our case from Indonesia. The application of competitive intelligence can formulate various strategies for managing vocational secondary schools that can be applied by utilizing various strengths they have and utilizing opportunities that are available and fast ways to produce competitive work. Minimizing weakness with the right strategy can reduce the weaknesses specified. Appropriate implementation strategies to enhance competitiveness and ensure the sustainability of vocational secondary schools in the long term are needed.

6. REFERENCES

[1] B. Adil, B. Adil, B. Mustapha, T. Malika, and B. Said, "The ICT-Empowered Pedagogy of Educational Supervisors and the Engineering of their Accompanying Role as Conductive to Quality Teacher Performance," *Int. J. Adv. Trends Comput. Sci. Eng.*, vol. 8, no. 1.4, pp. 434–438, 2019.

[2] S. I. BPS, "Keadaan Pekerja di Indonesia Agustus 2018 (Laborer Situation in Indonesia Agustus 2018)," 2018.

[3] S. I. BPS, "Statistical Yearbook of Indonesia 2017," Jakarta, 2017.

[4] D. P. S. M. K. K. P. dan K. PSMK, *Buku Data SMK 2017/2018*, 2017th ed. Jakarta: Direktorat Pembinaan Sekolah Menengah Kejuruan (PSMK), Kementerian Pendidikan dan Kebudayaan, 2017.

[5] A. Mazouak, M. Tridane, and S. Belaaouad, "Digital in the administrative management of Moroccan School: Contributions, Challenges and Constraints," *Int. J. Adv. Trends Comput. Sci. Eng.*, vol. 8, no. 1.4, pp. 267–271, 2019.

[6] R. Pellissier, "Towards a universal competitive intelligence process model," *SA J. Inf. Manag.*, vol. 15, no. 2, pp. 1–8, 2009.

[7] M. Alnoukari, R. Razouk, and A. Hanano, "BSC-SI : A Framework for Integrating Strategic Intelligence in Corporate Strategic Management," *Int. J. Soc. Organ. Dyn. IT*, vol. 5, no. 2, pp. 1–14, 2016.

[8] G. Opait, G. Bleoju, R. Nistor, and A. Capatina, "The in fl uences of competitive intelligence budgets on informational energy dynamics ☆," *J. Bus. Res.*, 2015.

[9] Y. Zhang, D. K. R. Robinson, A. L. Porter, D. Zhu, G. Zhang, and J. Lu, "Technological Forecasting & Social Change Technology roadmapping for competitive technical intelligence," *Technol. Forecast. Soc. Chang.*, 2015.

[10] L. Stefanikova, M. Rypakova, and K. Moravcikova, "The impact of competitive intelligence on sustainable growth of the enterprises," *Procedia Econ. Financ.*, vol. 26, no. 15, pp. 209–214, 2015.

[11] J. R. B. V R Palilingan, "Profession recommended system for higher education students using Bayesian method Profession recommended system for higher education students using Bayesian method," *IOP Conf. Ser. Mater. Sci. Eng. 434*, vol. 424, no. 2018, pp. 1–7, 2018.

[12] T. Plessis and M. Gulwa, "Developing a competitive intelligence strategy framework supporting the competitive intelligence needs of a financial institution ' s decision makers Research methodology," *South African J. Inf. Manag.*, pp. 1–8, 2016.

[13] V. R. Palilingan and J. R. Batmetan, "Competitive Intelligence framework for Increasing Competitiveness Vocational High School Management," *Adv. Soc. Sci. Educ. Humanit. Res.*, vol. 299, no. Ictvet 2018, pp. 230–233, 2019.

[14] M. Shujahat, S. Hussain, M. I. Malik, and J. Ali, "Strategic management model with lens of knowledge management and competitive intelligence A review approach," *VINE J. Inf. Knowl. Manag. Syst.*, vol. 47, no. 1, pp. 55–93, 2017.

[15] T. Colakoglu[a], "The Problematic Of Competitive Intelligence : How To Evaluate & Develop Competitive Intelligence ?," *Procedia - Soc. Behav. Sci.*, vol. 24, pp. 1615–1623, 2011.

[16] M. Prilop and F. Moez, "Designing Analytical Approaches for Interactive Competitive Intelligence," *Int. J. Serv. Sci. Manag. Eng. Technol.*, vol. 4, no. 2, pp. 34–45, 2013.

[17] B. John, C. Milewicz, S. Lee, and A. Sahaym, "Industrial Marketing Management Salesperson competitive intelligence and performance : The role of product knowledge and sales force automation usage," *Ind. Mark. Manag.*, 2013.

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Effect of competitive intelligence on innovation capability: An exploratory study in Mexican companies

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ABSTRACT Market globalization and fast technological change drive organizations to apply information management systems that allow them to analyze information and convert it into intelligence. Because of this, companies need to manage information for decision making. This process is complex, beginning at the level of the company's strategy, and reaching all the way to manufacturing strategy, with the creation, development and deployment of the technological capabilities needed for quick and flexible responses to customers and market situations and their changes. The information can be gathered and managed through several models, mainly, competitive intelligence, knowledge management and intellectual capital. This article presents an investigation using a methodology of structural equation modeling for the identification of the intelligence factors, to evaluate their relative importance and relationships with the innovation capability of Mexican companies. The empirical results show that the relationship between competitive intelligence and the innovation capability is indirect, with knowledge management as a mediating factor.

KEYWORDS Competitive intelligence, innovation capability, structural equations modelling

1. INTRODUCTION

In our highly competitive business environments, companies need ways to manage information for decision making purposes. This is a difficult management function. Deciding the needs, type and specific information can be a hazardous problem, as is the design and characteristics of the information management system required, so useful and timely information is available for the determination and management of the technological capabilities and competences for the delivery of the right goods. This information has several sources and can be obtained by typical functions of competitive intelligence, knowledge management and intellectual capital, which are briefly discussed in the following paragraphs.

Competitive intelligence (CI) is defined as a systematic effort aimed at specific objectives, ethical and in a timely manner, to collect, synthesize and analyse relevant information on competition, markets and the external environment, with the purpose of producing actionable information that can provide a competitive advantage (Fleisher, 2009; Rodríguez & Chávez, 2011; Prescott & Miller, 2002). Knowledge management (KM) is of great interest in areas of business administration, industrial engineering and communication because it focuses on the organization, acquisition, storage and use of knowledge to achieve objectives such as problem solving, dynamic learning, strategic planning and decision making (Hammed 2004, cited by Herschel and Jones, 2005). The

interest related to the set of intangible assets, such as knowledge, held by a company known as intellectual capital (IC) has aroused similar interest. Also worth noting is that knowledge is an important source of competitive advantage (Shujahat et al., 2017; Rodríguez Gómez, 2006; Prusak, 1997), therefore, the identification of the most important factors for the effective management of the three information sources (CI, KM & IC) has the utmost importance. Although these theories manage information and knowledge, the relationship between them and innovation capability is not clear in the literature.

2. METHODOLOGY

This investigation is managed by a three-step process. First, a literature review made a list of the factors of CI, KM, the IC and innovation capability. With the list of factors, a questionnaire was constructed, tested and evaluated. The internal reliability was also estimated. In step two, an initial exploratory analysis gave outlier values using the Mahalanobis distance method. Following that was a Kaiser-Meyer-Olkin test for sample fit and a Bartlett's Sphericity test of the correlations. This determined if they were adequate for the modelling process. Step three, was the structural equations modelling process, beginning with the model specification, followed by the identification and the estimation, the test of the model and the Lomax & Schumacker (2012) modification. Statistical analyses are done with Minitab v. 17, SPSS v. 22, and Amos v. 22.

For the purpose of this study, structural equations modelling (SEM) is utilized because it is useful for the analysis of the relationships between the observed variables (items) and the latent variables (factors). SEM uses a confirmatory approach for the analysis of the theory related to some phenomena (Byrne, 2010). It is increasingly used because researches are aware of the need to use multiple constructs or observed variables to explain the phenomena in question, investigating more advanced and complex theoretical models. The software is also spreading and getting friendlier (Lomax & Schumacker, 2012). SEM has been applied in several fields is the search for predictors of effectiveness in Mexico. For instance, in total productive maintenance (Hernández et al., 2018), organizational philosophy, (Davila et al., 2017), and in single minute exchange of dies (Romero et al., 2011).

3. RESULTS

In the first step, with the critical success factors obtained from the literature review, we constructed a questionnaire with a five category Likert scale, in which 1 represents a "non-important" level and the highest, 5, means "extremely important". It is applied to a sample size of 40 participants who possess the attributes to be measured from the target population. This sample size ranges from 30 to 40, as recommended by Hertzog (2008). The type of sampling is for convenience (Malhorta, 2008), and the information gathered was determined by the questionnaire for internal consistency with the Cronbach alpha coefficient. A Cronbach alpha of 0.965 indicates the questionnaire reliability is good, accordingly to Tavakol & Dennick, (2011). Then, the questionnaire was given to 214 engineers from 32 automotive and electronics transnational companies. A sample size of more than 200 is recommended by Lloret et al. (2014).

In the second step, the initial scan analysis indicated that data were missing in 35 questionnaires. This was followed by the identification of outliers in the remaining 178 questionnaires. This was done using the Mahalanobis distance method, using Minitab V. 17. Given the points on the reference line, Y = 6.387, there are 29 outliers that will be eliminated (Figure 1).

Next we performed a Kaiser-Meyer-Olkin fit test and a Bartlett's sphericity test of the correlation between the variables and the adequacy of the sample for the factor the analysis gave. The former was 0.930, indicating small partial correlations, which was precisely measured as a common factor. In the Barter's test, the Chi-square = 2918.587, fd = 325, & a p-value = 0.000 means that the correlations matrix is not an identity matrix,

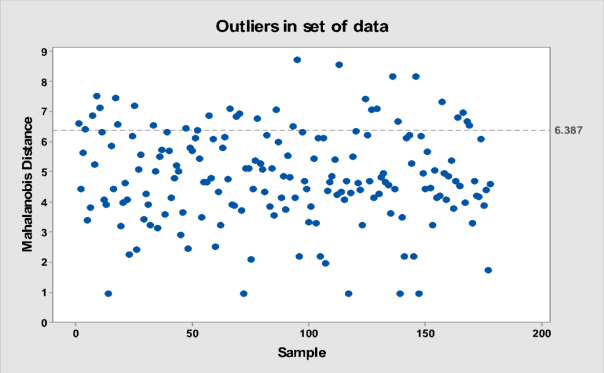

Figure 1 Outliers data chart.

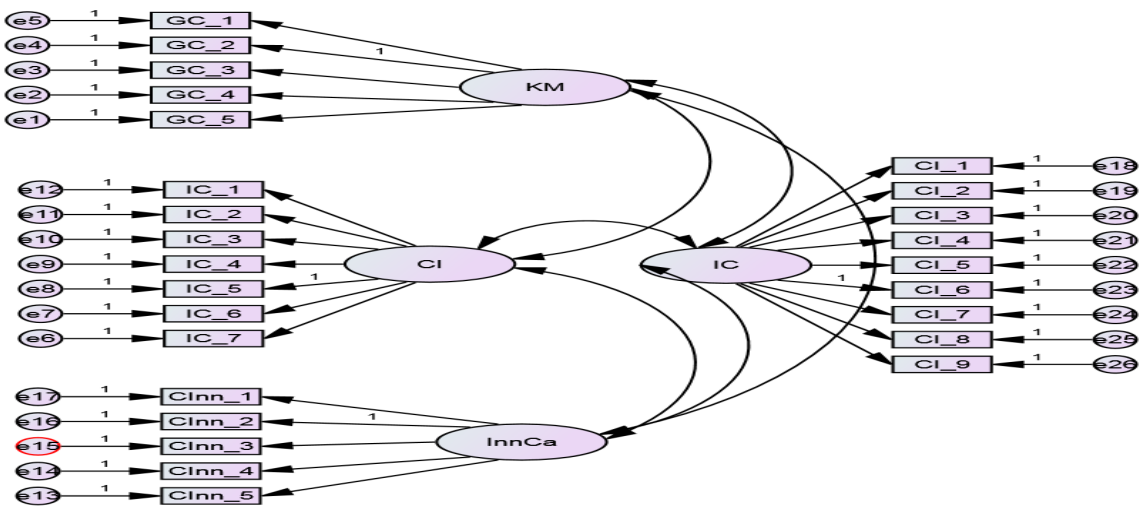

Figure 2 Hypothesized confirmatory factorial model.

indicating there is a high correlation, which is acceptable according to Levy et al. (2003).

Finally, the factor correlations and the factor loads were determined using the main axes method to extract the factors, and the Promax method for its rotation. The factor loads for all items exceeded the recommended level of 0.60 (Hair et al., 1998). This was followed by calculations of the composite reliability, convergent validity and discriminant validity. The composite reliability (CR) values are in the range of 0.87 to 0.92, exceeding the recommended level of 0.70. The average variances extracted (AVE) are in the range of 0.59 to 0.64, exceeding the recommended level of 0.5 (Hair et al., 1998). The discriminant validity was examined and results of the analysis show that the square correlations for each construct are smaller than the average variance extracted (Matzler & Renzl, 2006). These results indicate that the measured items have good reliability and validity.

In step three, we established relationships between the variables of the theoretical model, according to the theory being scrutinized. This was required to specify the model, meaning that to determine the best model capable of producing the sample covariance matrix, we must find the one that presents the theory under construction. Now we have the second order hypothetical factorial model (Figure 2), giving four latent variables and 26 observed variables. Then, the model is identified. In this process, all the parameters have to be specified as free, restricted or fixed. Then the parameters are combined to construct the implicit variance-covariance matrix of the model, to determine the differences between the real model by the data gathered and the implicit theoretical model.

Once the model and the parameters are specified, they are combined in the Σ variance-covariance matrix implicit of the model. A free parameter is unknown, but needs to be specified. A fixed parameter has a specific value in the range [0,1] and a restricted one, also is unknown but is equal to one or more parameters (Lomax & Schumacker, 2012). Because the number of values estimated (S = 171) is bigger than the number of free parameters (42), the model is identified and the free parameters can be estimated.

The estimation of the model gives the estimation of all the parameters. The regression weights and structure coefficients of the hypothetical model are significant as α =0.05 is lower than the p-value. Calculations were made with AMOS v.22 with the method of maximum likelihood, which is adequate for normally distributed data, as well as ordinal and moderately non-normal data.

The test of the model indicates the degree at which the variance-covariance data of the sample fit the structural equations model. For this purpose, several fit indexes are calculated, among them, Chi-square = 522.176, p-value = 0.000, and CMIN/DF = 1.782, which is smaller than the value recommended of 3. AGFI = 0.77, which is less than 0.80; the comparative adjustment index, CFI = 0.94, is bigger than 0.9, as recommended by Chau & Hu (2001). The

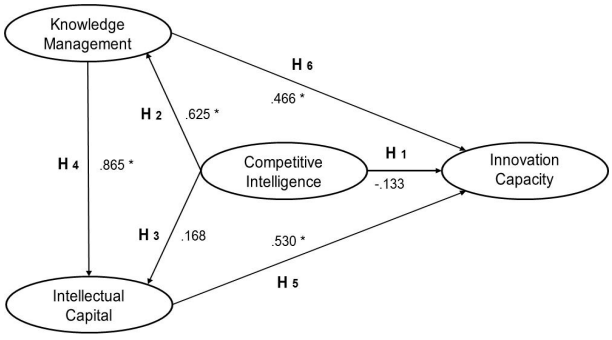

Figure 3 Hypothesized structural model.

root mean square error aprox. (RMSEA) is 0.073, which is lower than the limit 0.08 proposed by Browne & Cudeck (1993). The estimated adjustment indexes combined indicate a good adjustment of the data to the model. Due to this there was no modification of the model.

4. CONCLUSIONS

In the hypothesized structural model, four factors are identified with six structural coefficients, assuming that each of the estimations is an effect between the latent variables. We have the four hypotheses (H_2, H_4, H_5 and H_6) with significant structural coefficients (Figure 3).

These empirical results support the acceptance of the hypotheses:

H_2: Competitive intelligence influences knowledge management

H_4: Knowledge management influences intellectual capital

H_5: Intellectual capital influences innovative capability

H_6: Knowledge management influences innovative capability

That is, CI has a positive effect on KM; intellectual capital has a positive effect on IC, and KM has a positive effect on both intellectual capital and IC. The results are consistent with studies that analyze the relationship of KM with intellectual capital (Serenko et al., 2010; Diez et al., 2010; Kianto et al., 2014); and intellectual capital with IC (Santos-Rodrigues, 2011; Wang & Chen, 2013; Sivalogathasan & Wu, 2013).

However, the results also reflect, for lack of sufficient statistical evidence, that the following hypotheses are rejected:

H_1: Competitive intelligence influences innovation capability

H_3: Competitive intelligence influences intellectual capital

In the case of H_1, the empirical results coincide with a similar study that concludes CI activities are not yet carried out (formally) in order to improve the innovation capability of (Mexican) companies (Güemes & Rodríguez, 2006). This might be explained by means of the combination of several factors, the fact that CI activities are incipient. Recommendations are not acknowledged and followed, therefore, although CI has a direct impact, it is small, but its combination with KM enhances the explanations and because the information is more properly managed, increases the impact. On the other hand, when analyzing the results of the indirect effects, a high value is observed of the indirect effect of CI and IC (.667). Given the above, although there is no direct effect of CI on IC, there is an effect through KM as a mediating factor. These results support the importance of integrating KM and CI with the intention of obtaining better results (Herschel & Jones, 2005; Galeano et al., 2008; Sharp, 2008; Ramirez et al., 2012) and as a source of competitive advantage for companies (Rothberg & Erickson, 2013; Chawinga & Chipeta, 2017; Shujahat et al., 2017).

5. RECOMMENDATIONS

The results obtained are valuable, because they could be used to carry out studies to evaluate the effect of CI on the IC of organizations, and even consider the possibility of defining the course of study that evaluated the mediating effect of KM between CI with IC.

Although the main limitation of the study is the sample size, several aspects indicatate the study is still valid. These include:

- The internal consistency of the IM (Cronbach's alpha) and KMO greater than the recommended of .70;
- Compliance with the cases of convergent validity and discriminant validity;
- Compliance with the model fit criteria.

This paper constitutes evidence that SEM is a powerful tool for the determination of total or partial effects, direct or indirect between a measurable variable and a latent variable, as

in the effects between latent variables or constructs.

6. REFERENCES

Bartes, F. (2015). The objectives of competitive intelligence as a part of corporative development strategy. ACTA Universitatis Agriculturae ET Silviculturae Mendelianae Brunensis, 62(6), 1243-1250.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. *Sage focus editions*, *154*, 136-136.

Byrne, B. (2010). Structural Equation Modeling With AMOS: Basic Concepts, Applications, Programming, 2nd edition.

Calof, J., & Smith, J. (2010). The integrative domain of foresight and competitive intelligence and its impact on R&D management. R and D Management, 40(1), 31–39.

Chau P., & Hu P. (2001). Information technology acceptance by individual professional: a model comparison approach, Decision Sciences 32 (4) 699–719.

Chawinga, W. D., & Chipeta, G. T. (2017). A synergy of knowledge management and competitive intelligence: A key for competitive advantage in small and medium business enterprises. *Business Information Review*, *34*(1), 25-36.

Dávila Soltero, F., Noriega Morales, S., Máynez Guaderrama, A. I., Hernández Gómez, A., & Torres Arguelles, V. (2017). Modelo de factores críticos del éxito para el despliegue de programas de filosofía organizacional. *Nova scientia*, *9*(18), 459-485.

Díez, J. M., Ochoa, M. L., Prieto, M. B., & Santidrián, A. (2010). Intellectual capital and value creation in Spanish firms. *Journal of Intellectual Capital*, *11*(3), 348–367.

Fleisher, C. S. (2009). Examining Differences in Competitive Intelligence Practice: China, Japan, and the West By, *3000*, 249–261.

Galeano, S., Sanchez, M., y Villareal, M. (2008). Modelo de gestión del conocimiento apoyado en la vigilancia tecnológica y la inteligencia competitiva para la cadena productiva de la uva isabella en la bioregión del Valle del Cauca. Cuaderno de Administración / Universidad del Valle/ no. 40. pp 73-93.

Güemes, D., y Rodríguez, M. (2007). La relación entre la inteligencia competitiva y la capacidad innovadora de las empresas mexicanas Puzzle: Revista Hispana de La Inteligencia Competitiva, 6(26), 21–27.

Hair,J.; Anderson, R. & Tatham, W. (1998). Multivariate Data Analysis with Reading, Prentice-Hall, Upper Saddle River, NJ.

Hernández, G. A., Noriega, M. S., Torres-Argüelles, V., Guaderrama, A. I. M., & Martínez, G. E. (2018). Validity and Reliability Evaluation of a Scale to Measure the Management of Total Productive Maintenance. *Indian Journal of Science and Technology*, *8*(1).

Herschel, T. & Jones, N. (2005),"Knowledge management and business intelligence: the importance of integration", Journal of Knowledge Management, Vol. 9 Issn 4 pp. 45 – 55

Hertzog, M. A. (2008). Considerations in determining sample size for pilot studies. Research in nursing & health, 31(2), 180-191.

Kianto, A., Ritala, P., Spender, J. C., & Vanhala, M. (2014). The interaction of intellectual capital assets and knowledge management practices in organizational value creation. Journal of Intellectual capital, 15(3), 362-375.

Levy Manquin, J. P., Varela Mallou, J., & Abad Gonzalez, J. (2003). Analisis Multivariable Para Las Ciencias Sociales/Jean-Pierre Levy Mangin, Jesus Varela Mallou Y Julio Aban Gonzalez..(Etal) (No. Ha29. 5. S62. A52 2003.).

Lloret-Segura, S., Ferreres-Traver, A., Hernández-Baeza, A., & Tomás-Marco, I. (2014). El análisis factorial exploratorio de los ítems: una guía práctica, revisada y actualizada. *Anales de psicología*, *30*(3), 1151-1169.

Lomax, R. G., & Schumacker, R. E. (2012). A beginner's guide to structural equation modeling. New York, NY: Routledge Academic. 3rd ed.

Malhotra, N. (2008). Investigación de mercados, quinta edición, editorial Pearson Educación.México ISBN:978-970-26-1185-1

Matzler, K., & Renzl, B. (2006). The relationship between interpersonal trust, employee satisfaction, and employee loyalty. *Total quality management and business excellence*, *17*(10), 1261-1271.

Prescott, J. F., & Miller, S. H. (2002). *Proven strategies in competitive intelligence: lessons from the trenches*. John Wiley & Sons.

Prusak, L. (1997), *Knowledge in organizations*, Boston, Butterworth-Heinemann.

Rodríguez Gómez, D. (2006). Modelos para la creación y gestión del conocimiento: una aproximación teórica.

Rodríguez, M. (2005). *Sistema Nacional de Inteligencia Competitiva y Tecnológica: Educación para un desarrollo innovador*. Puzzle Revista Hispana de la Inteligencia Competitiva, 4(16), 12-19. PUZZLE 2005, ISSN 1696-8573.

Rodríguez, M., y Chávez, S. M. (2011). Propuesta de integración de la Inteligencia Competitiva y Tecnológica con el Kansei Engineering en el diseño de estufas de inducción magnética, *6*(73), 827–844.

Romero, R., & Noriega, S. (2011). Critical success factors of quick setup projects.

Rothberg, H., & Erickson, S. (2013). Intelligence in the oil patch: knowledge management and competitive intelligence insights. In *Academic Conferences International Limited, Kidmore End* (p. 387).

Santos-Rodrigues, H., Figuera-Dorrego, P., & Fernández-Jardón, C. (2011).*La influencia del capital intelectual en la capacidad de innovación de las empresas del sector de automoción de la Eurorregión Galicia Norte de Portugal*. Servizo de Publicacións da Universidade de Vigo.

Serenko, A., Bontis, N., Booker, L., Sadeddin, K., & Hardie, T. (2010). A scientometric analysis of knowledge management and intellectual capital academic literature (1994-2008). Journal of knowledge management, 14(1), 3-23.

Sharp S., (2008), "Competitive Intelligence Advantage: How to Minimize Risk, Avoid 2New Jersey.

Shujahat, M., Hussain, S., Javed, S., Malik, M. I., Thurasamy, R., & Ali, J. (2017). Strategic management model with lens of knowledge management and competitive intelligence: A review approach. VINE Journal of Information and Knowledge Management Systems, 47(1), 55-93.

Sivalogathasan, V., & Wu, X. (2013). Intellectual capital for innovation capability: a conceptual model for innovation. International Journal of Trade, Economics and Finance, Vol. 4, No. 3, June 2013

Stefanikova, L., Rypakova, M., & Moravcikova, K. (2015). The impact of competitive intelligence on sustainable growth of the enterprises, 26(15), 209–214.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. International Journal of Medical Education, 2,53–55.

Tej Adidam, P., 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.

Wang, D., & Chen, S. (2013). Does intellectual capital matter? High-performance work systems and bilateral innovative capabilities. International Journal of Manpower, 34 (8), 861-879.