ISSN: 2001-015X

Journal of Intelligence Studies in Business

Vol 10, No 3, 2020

Journal of Intelligence Studies in Business

Vol. 10, No. 3 2020

Included in this printed copy:

Editor-in-chief:
Klaus Solberg Søilen

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PUBLISHER

Halmstad University, Sweden
First published in 2011. ISSN: 2001-015X.
Owned by Adhou Communications AB

Journal of Intelligence Studies in Business

Journal of Intelligence Studies in Business
Vol. 10, No 3 (2020) p. 4-7
Open Access: Freely available at: https://ojs.hh.se/

Stevan Dedijer
1911-2004

Labeling or science-by-buzzwords: The semantic trap in academic research and how to get out of it

The social sciences are drowning in new fancy academic terms or buzzwords, labels with unprecise definitions, rebranding phenomenon that somehow seem familiar. We are all surrounded by smart cities, innovation, and sustainability. What do these terms mean that we could not express earlier? Introducing them also raises new questions, which at first may seem provocative: Are there dumb cities too, if so where? Do we carry out research at our universities that is not innovative? Does the literature on sustainability make our products more sustainable? Above all, these new fields are formulated in almost suspiciously positive terms attracting the attention of our politicians and echoed everywhere. How can anyone be against smart cities, innovation and sustainability? It must be good, important and therefore it deserves funding.

Creating new terms to describe what is mostly old and familiar problems (relabeling) is not helping move science forward but instead hindering its development as it leads the researcher to believe he or she is setting out on a new quest, while often just ignoring past literature, especially that written in French and German languages, which then suddenly does not apply. The same is true for intelligence studies. "Research" today is too often reduced to searching for articles in one of two commercial databases: Web of Science (Clarivate Analytics) or Scopus (Elsevier), basically consisting of articles that has been written during the past two generations. Here we are supposed to cite the most cites articles, even though the same ideas (but with different words) have been expressed numerous times before in older articles, books or are just common sense, so that whoever wrote the first article become popular. This then is the pyramid scheme of the brave new world of the social sciences, a system that creates academic peacocks The majority of social science researchers today are not first of all knowledgeable in say economics or business, but of how to produce articles. That is a skill that has less to do with what is happening in the real world of social behavior.

That is the price we must pay, some say, but the actual production of research also attracts very little attention outside of the circle of academics who contribute to it. Moreover, it makes our business education less relevant. Ask yourself, if today's business education was relevant, why are the Chinese outperforming the West? Why are there so few famous business schools in economically successful countries like Germany, Taiwan, or South Korea? Who teaches you how best to succeed in business life, the authors of the most cites scientific articles in business and management or the Chinse classic authors, like Confucius or Sun Tzu?

When I got interested in intelligence as a business student it was based on the notion that better information can make organizations more competitive. This was still during the first generation after the start of what was called the information age, when companies realized that information and knowledge, not physical assets, were the most important ingredients for business success. There was no internet, nor mobile phones. I was interested in the following questions:

1. How do organizations work with information?
2. What is the most effective way for organizations to work with information to obtain a competitive advantage?
3. Why are organizations not working more effectively with information?

I was interested in these questions from an international perspective, curious about the relationship between specific cultures and production. So, much like Marco Polo, I asked myself:

4. What can we sell to other countries and what can we buy from them?
5. What is the best way of doing this?

I am still predominantly interested in these questions and Marco Polo seems to follow me in my thoughts wherever I go and seek new knowledge. I am not interested in the semantics surrounding these questions, the new terms that are introduced more as labels than to give a more exact definition of the underlying phenomenon we are looking at. To make things even worse, these new labels change, and quite frequently, in what looks like ever-shorter life cycles of social science research fields, replacing each other after quick overlaps. It is much like watching trends in the clothing industry. Suddenly you realize that your corduroy pants that work perfectly and have no holes in them need to be changed out. Your surroundings demand it.

To take a more fitting example: I was interested in how people work together with information as we started a research project on why employees hide information. Here, I am not interested in collective intelligence, competitive intelligence, co-creation, wisdom of crowds, knowledge management, complex systems, or systems theory, just to take some examples. I am first of all interested in the problem.

Many academics mix labels with theory. Theory does not mean to name labels, but to present similar problems in other studies, to say if they reached similar or different results and to try to explain why this may have been the case and what it means for our own study. This can be done almost completely without using labels.

Still, I tend to spend more time on semantics than on actual problems, very much against my own will. It's like my academic surroundings impose this on me. It seems that most business researchers fall into the same semantic trap. It's not only due to how we label problems with key words in databases, but also to the way we organize ourselves as researchers.

The process can be explained as follows: Business researchers quickly try to own the terms that they become interested in instead of focusing on the problems and problem areas that they are interested in. Instead of broadening the field, we narrow it, becoming specialists in ever smaller parts, all with their own labels. After a few rounds we are no longer in contact with business life anymore.

There is another variation of this problem and that is when the academic discipline is in close contact with industry even though it is erroneous. To me the scariest example of this is the study of economics after Keynes, which is sometimes referred to as Neoclassic economics. It seems clear to me that the major reason that banks, the financial sector and the organizations supporting this industry pay lip service to the study of modern economics is that it legitimizes a corrupt and close to bankrupt system that does little good to others outside of its own members.

Any problem can be studied from the perspective of numerous terms. Often it does not matter which term we use as there are many terms that overlap and can be relevant simultaneously. Instead of accepting this, academics strive to own the terms they chose to use and to disown others, especially those that are closely linked. As soon as we identify ourselves with one term, we start to oppose other, similar terms, treating them almost as competitors, as we often compete for the same or similar research positions and grants. New academics come along and pick their label, often by accident, for example, when adopting the preferred label of a supervisor, until each term forms or constitutes an academic tribe. These academic tribes then develop their own conferences and journals, and an internal struggle finds place, a race to establish legitimacy around an internal hierarchy most often built on the popularity (impact) of articles, and less so on the quality of the content or its relevance.

It's also possible to be in several tribes at the same time, even though academics normally have a clear preference of one above the other, simply because it's difficult to excel in more than one area. As an example, authors in the field of collective intelligence also study artificial intelligence, collective behaviour, swarm intelligence, complex systems, machine learning, human-computer interaction, multi-agent systems, sustainability, information systems design, crowd work, evolutionary computation, social decision making, empathy justice, foresight, futures research, crowdsourcing, information systems network, and/or democratic theory. Collective Intelligence is used synonymously or in combination with co-creation, wisdom of crowds, opens source, social systems, and social complexity, all with their own tribes. Within intelligence studies we have sub-tribes in the form of competitive intelligence, market intelligence, competitor intelligence, business intelligence, enterprise resource planning, social intelligence, all of whom deal with the problem of collective intelligence. Close by there are the tribes of futures studies and foresight. In a corner sits the library sciences. Across the road there are the tribes of decision making, decision sciences, information sciences. All are quite familiar with the same phenomenon studied as collective intelligence. In other disciplines there are similar labels and key words, for example collective behavior in the study of sociology. The problem is that researchers seldom direct their attention outside of their own tribe. This is not only an odd scientific process, but we are witnessing an enormous waste of intellectual ability and potential. So, how do we solve it?

To become more relevant academic research must redirect its focus from buzzwords to problems, not just smart "research gaps" in the literature. Instead of listing keywords, researchers, academic journals and academic databases should list problems (1), and the problems should be stated in full sentences (2) using as few (3) and as simple words as possible (4). We should also insist on clear, mutually exclusive definitions. By searching for problems instead of labels it will become much easier to find relevant research across different labels and disciplines.

We need to be much stricter when admitting new labels. If a new term is not exact and not much different from a previous term it should be declined. Focus should be on what the Germans since the 19th century understand by "verstehen", as the "interpretive or participatory" examination of social phenomena, not on coining new terms. Today new terms often come to life because we did not read enough, or we thought more about internal marketing and our own self-promotion instead of focusing on problems that are important for humanity. We are all guilty of this to a certain degree as it's difficult to escape the logic trap that is our current social science research system.

We need to instill a new critical process of thinking by asking: What problem does this field of study lay claim to? Are there other studies that lay claim to the same problem? If yes, go back to the previous field. If it does not exist anywhere, and if you are 100% certain, only then can you coin a new term after consulting with your peers. This process would lead to the merger of most of all existing social science research today. The same could then be done with conferences and academic journals. Larger academic groups will again improve the quality of journals and conferences, thus improve the advancement of science.

To complicate things further labels are sometimes decided outside of academia. The world of business is basically changed by its practitioners, not by academics. As an example, competitive and market intelligence is now often replaced by competitive and market insights (CMI) in many major companies. The intelligence label was always problematic and the association to the world of spying never quite washed off. It did not help that many successful business intelligence companies functioned more as private eyes with aggressive methods despite organizations like SCIP setting standards to the contrary. Many were also skeptical to what they understood as an Anglo-Saxon and predominantly American agenda to spread the practice of industrial espionage advocated by consultants centered around Langley.

The difference between the term intelligence and insights is not significant. It basically means the same: valuable information, need-to-know for the competitiveness of the firm. Put differently, there is hardly any part of insights that cannot be seen as intelligence and vice versa. However, it could be argued that market insight is a broader take on business information. It could be said that it brings together a wider group of fields, both practitioner and academics, some of whom were left behind in the process when smaller academic tribes were created. Market researchers, business intelligence specialists and all kinds of information scientists are now lured back together under the umbrella of earlier pioneers like the visionary businessman Alvin Toffler, the mathematician Claud Shannon, and Gabriel Naudé, the father of library sciences, just to give a few examples. The "insight people" have already started to form their own group. Academics are likely to follow. Other academics are already finding themselves sitting in groups that are no longer relevant wondering what happened.

The academic projects that are the most successful will always be those that follow the development in business life. The discipline of digital marketing is a good example. Digital marketing is fundamentally different from the old "brick marketing," to the point that if you do not understand its logic today then your education is not relevant any longer. It took academia a long time to understand this and for a few years the whole discipline of marketing was terribly far behind reality. The advancement of the field still almost exclusively finds its place in business organizations. Academics are mostly trying to run after and catch up with the practitioners in this field of study. One reason for this is that advancements in digital marketing demand substantial IT infrastructure that academics do not have easy access to. The situation is similar in business intelligence, which is basically about new software today. The leading AI experts do not work in academia but in the major tech companies.

It is all about being relevant and useful. In intelligence studies there is a demand on us that we integrate business practices with more technology (hardware and software). Only then can we hope to make real academic contributions in this field. We stand in front of an almost awkward situation: The intelligence field has never been more relevant in the history of mankind as information has become the most important ingredient for competitive advantage. And the more information, and the better information, the more valuable the company. All the new and major MNEs around us are living proof of this, whether it be Alphabet (Google), Netflix, Spotify, Facebook or Alibaba. To understand and be able to contribute to this domain we must be interested in the same problems that they are trying to solve. To this aim the labels are often just distractions, asemantic trap.

The first three articles in this issue deal with different forms of literature and domain analysis, linking competitive intelligence to other fields of study.

The article by Miguel-Ángel García-Madurga and Miguel-Ángel Esteban-Navarro entitled "A project management approach to competitive intelligence" examines the relationship between competitive intelligence (CI) and project management (PM).

The article by Mouhib Alnoukari is entitled "An examination of the organizational impact of business intelligence and big data based on management theory". According to a literature analysis done by the authors, both the dynamic capability view and resource based theory are the most dominant organizational theories that have been used to investigate BI & BD related issues.

The article by Stefan Zwerenz is entitled "The linkage between competitive intelligence and competitive advantage in emerging market business - a case in the commercial vehicle industry". The results of this case help businesses to improve CI, its constructs, its products and process for a better linkage to competitive advantage and firm performance.

The last two articles are related to accounting. The article by Phan Thi Bao Quyen and Nguyen Phong Nguyen entitled "The impact of perceived accounting benefits on the enterprise resource planning success: the mediating role of effective system use" studies the accounting benefits of adopting ERP systems. The authors conclude that there is support for perceived accounting benefits of ERP systems on enterprise success. They also argue that this conclusion is supported by effective system use.

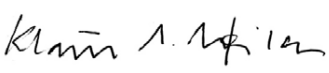
The article by Muhammad Ikbala, Irwansyaha Irwansyaha, Ardi Pamintob, Yana Ulfaha, and Dio Caisar Darmac entitled "Financial intelligence: Financial statement fraud in Indonesia" deals with the problem of financial fraud in Indonesia. The results of the non-parametric relationship analysis show that although there is a possibility that the more experienced the auditor will be the more able to detect fraud and manipulation in the organization, the relationship is relatively weak. Findings also show that all auditors who have a CFE certificate find it easier to find fraud in the company.

With this issue JISIB celebrates 10 years of publications. During the first years it was difficult to get enough quality articles for every issue, but now we get interesting and relevant articles submitted every week and reject more than 80%.

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. Take care in these strange times when a new virus, COVID-19, is ravaging the planet.

On behalf of the Editorial Board,

Sincerely Yours,



Prof. Dr. Klaus Solberg Søilen
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Journal of Intelligence Studies in Business
Vol. 10, No. 3 (2020) pp. 8-23
Open Access: Freely available at: https://ojs.hh.se/

A project management approach to competitive intelligence

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OPINION ARTICLE

Received 9 June 2020 Accepted 26 October 2020

ABSTRACT The research problem that this study seeks to solve is to examine the relationship between competitive intelligence (CI) and project management (PM). These disciplines coincide in their threefold approach to action, collection of results, and ability to react in response to environmental signs. However, the academic and professional literature has not explored the possible synergies between CI and PM, with the exception of the seminal proposals by Prescott in 1988 and 1999. The aim of this opinion article is to propose a new methodological approach for the production and transfer of CI in accordance with the international standards of PM. The methodology consists of an inductive reasoning process from specific observations and evidence gathered in our professional experience as CI practitioners over twenty years, contrasted with the findings of the scientific literature, the PMBOK® Guide of the Project Management Institute, and with the CI model proposed by the most relevant Spanish technical standards in R&D&I management and strategic intelligence management. The paper discusses the vision of intelligence production and dissemination in a project with five phases or groups of processes: initiation, planning, execution, monitoring and control, and closure. Also, the responsibilities of the human intelligence team are exposed. This proposal could be an alternative to the departmental-based intelligence cycle model more aligned with the organizational culture and the usual operational practices and business processes of companies, founded on the design and deployment of projects with a specific beginning and end that is carried out to create a product, service or unique result. It is concluded also that there is a need for undertaking experimental implementation and case studies of this proposal in companies and their assessment by future academic studies.

KEYWORDS Competitive intelligence, intelligence cycle, intelligence production, PMBOK, project management

1. INTRODUCTION

In a VUCA context (Volatility, Uncertainty, Complexity and Ambiguity of the current world) it is necessary to continually reconsider routines to survive. In the society of knowledge, today's certainties always become tomorrow's absurdities (Drucker, 1995). Looking around over a time horizon confirms that the only permanent thing is change. Organizations with a flexible corporate culture in relation to transformation establish warning systems that

allow anticipation. Competitive intelligence and project management help by identifying, facing and managing situations of change and, therefore, maintaining leadership positions.

Competitive intelligence provides relevant information, evaluated and analysed, oriented to the making and execution of decisions (Global Intelligence Alliance, 2013 a). It especially stresses the prevention of risks and threats and the identification of opportunities, which makes it a useful tool for the design of the organizational strategy, the start-up of operations and the making of actions of influence in the exterior. The bibliographic reviews show a broad coincidence in literature specialized in the distinctive elements of their nature (Calof and Wright, 2008; García-Alsina and Ortoll-Espinet, 2012). However, Solberg (2016) found in a recent study that existing definitions of competitive intelligence overlap with definitions of other more established fields of study, like decision sciences and marketing. Competitive intelligence can be applied to the deployment of all managerial functions (planning, organization, human resources management and control) and in all functional areas of a company (García-Madurga and Esteban-Navarro, 2018). The generic term competitive intelligence includes several specialized intelligences of use in the company: strategic intelligence, environmental scanning, customer intelligence, competitor intelligence, marketing intelligence, technical intelligence and supplier and manufacturing intelligence.

Project management is a management model that arose in the United States in the mid-20th century to guide the execution of complex processes that require the mobilization of numerous resources (financial, human, material and informative) and the participation of several functional units in an organization. A project is a temporary effort with a specific beginning and end that is carried out to create a product, service or unique result (Project Management Institute, 2017). The projects are planned following deterministic models, such as the work breakdown structure (WBS), critical path method (CPM) and program evaluation and review techniques (PERT)- that set objectives and clear deliverables, and which give oversight as they are executed. This requires continuous monitoring and documentation that allows one to maintain a high control over what is done and its effects, in order to quickly correct the course and align the actions with the decisions if necessary. It is crucial for the success of a project to have information about the activities and the evolution of the environment in all its phases. The PMBOK® Guide, Fundamentals for Project Management (2017, 6th ed.) of the Project Management Institute (PMI®, non-profit organization created in 1969 to defend the interests and serve professionals) is the reference document for a significant number of professionals around the world and it is considered the international standard.

The competitive intelligence and the project management disciplines coincide in their threefold approach to action, collection of results and ability to react in response to environmental signs. At a glance, and attending to its aims, intelligence reveals itself as a great help to manage projects. Considering that intelligence processes look for concrete results, they could be inspired by the methodology of this management model. On the other hand, organizing and carrying out activities as projects is a common practice in companies and also part of the skills of managers and middle managers, unlike in the case of intelligence.

However, none of the academic literature, professional literature or technical standards of both disciplines have ever explored the possible synergies between both disciplines; with the exception of the proposal by Prescott (1999) and Vedder et al. (1999), still undeveloped twenty years later, to consider intelligence as more of a process to be used by many in the execution of projects than an organizational function. Hence, it is considered relevant to enquire about new ways of incorporating intelligence into organizations to support the change and so strengthen their ability to adapt to a dynamic and constantly evolving environment.

The aim of this paper is to propose a new methodological approach for the production and transfer of competitive intelligence in accordance with the international standards of project management for its experimental implementation in companies and its assessment by future academic studies. This new approach can contribute to the expansion of the practice of competitive intelligence and, in the disciplinary field, to explore an improvement of the intelligence cycle more aligned with the way in which companies execute their business processes.

The methodology consists of an inductive reasoning process from specific observations

and evidence gathered in our professional experience as competitive intelligence practitioners over twenty years. This method of reasoning is founded on the assumption of various premises collected through informal participant observations. This includes what is learned from others, where there is not full assurance but where it provides a sufficient basis to develop arguments to compare in an inference process with the current theories and models. The method is founded on the emergent grounded theory approach that proposes "to develop a theory based on a participant's experiences and perspectives of a phenomenon" (Corbin and Strauss, 2008). The researchers do not need "clearly specified objectives, research questions, or a hypothesis before the initiation of the research project" (Flynn and Korcuska, 2018).

We contrasted the developed arguments with the findings of the scientific literature, the PMBOK® Guide of the Project Management Institute, and the cyclical model of intelligence, as it is proposed by the most relevant Spanish technical standards in R&D&I management and strategic intelligence management (AENOR, 2011; AENOR, 2015; UNE, 2018). These Spanish standards have no ISO equivalents. The results are a discussion about the dynamics of the management of competitive intelligence projects and the responsibilities of the human team involved.

2. LITERATURE REVIEW

2.1 Identifying the problem

The practice of competitive intelligence can be present throughout an organization or restricted as support for one or several strategic processes. Companies can choose between different models of implementation: occasional or usual purchase of intelligence reports from specialized companies, creation of an intelligence department with their own means, total or partial outsourcing of their management, or they can even dedicate part of the day of some management to the production of intelligence after equipping them with competence.

Many organizations still lack some kind of stable competitive intelligence structure. The consultant CRAYON (2018) has detected that, from 700 interviews of experts and consumers of competitive intelligence from 54 countries, in 17% of the companies interviewed no employee performs intelligence and in 24% only part of the day is dedicated to it by a single employee. It is also observed that, as the size of the company increases, so does the economic support given to competitive intelligence: 80% of the companies investigated with more than 1,000 employees have a specific intelligence team.

According to a global report by the Global Intelligence Alliance (2013b), 80% of the companies interviewed with an implemented competitive intelligence process show satisfaction with their return in spite of the benefits, which are usually not direct or immediate. A report by the Competitive Intelligence Foundation indicates that the main contributions of competitive intelligence are manifested in the creation of new products or services, reduction or elimination of costs, time savings, improvement of margins, increase or the creation of new sources of income and achievement of the company's financial objectives (Fehringer et al. 2016). A study of hundreds of companies from different industrial sectors that use competitive intelligence concludes that companies where the value of intangible assets has a higher *q Tobin* put more money in their budgets to intelligence, which is more valued by top management (Erickson and Rothberg, 2012).

The classic intelligence model presents the production of intelligence as a continuous and repetitive transformation process of information and knowledge articulated in a series of phases, which form a cycle. It begins with planning and direction, which includes the identification of intelligence requirements. The second phase consists of the collection and technical processing of information from documentation, via human and technological sources from different channels. It continues with the evaluation, integration, analysis and interpretation of the said information with a prospective orientation. It follows with the protection and communication of intelligence to predetermined users, generally with restricted diffusion. It concludes with an assessment of the whole process, taking into account the results of the application of intelligence, which can activate new intelligence needs and re-start the process.

There is a broad consensus regarding the basic configuration of the intelligence cycle (Figure 1), although the stated activities are grouped according to the authors in four, five, six or even seven stages (generally to separate the reception and the processing and whether or not to include the assessment report) and with certain variations in their denominations,

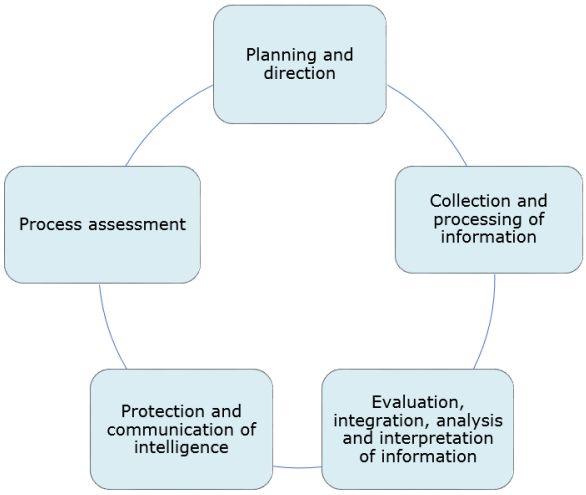

Figure 1 Universal model of the intelligence cycle (prepared by the authors).

which generates confusion. There is an exhaustive compilation of the visions of the intelligence cycle in Anglo-Saxon literature (Pellissier and Nenzhelele, 2013).

Although the intelligence cycle is considered the 'heart of the intelligence system' in an organization (Kahaner, 1998), this model has never been exempt from criticism coming from the perspective of its practical application. These deficiencies in the operations of the intelligence cycle have been outlined (Clark, 2004; Esteban-Navarro and Carvalho, 2012):

- It encourages no communication between those who obtain information and analysts.
- It arbitrarily assumes that analysts can control all variables on their own.
- It makes it difficult to know the real quality of data, as it masks potential problems during collection.
- It responds poorly to emergency situations where intelligence is required, even if it is provisional before having enough information.
- It does not establish channels to integrate the knowledge of a situation that the intelligence recipients have or the variations in their demands during the collection and analysis of information.
- It prevents managers and conductors from participating in the production of intelligence in a technological environment that enables easy and rapid access to information.

Therefore, it has even been proposed to view the cycle as a fundamentally theoretical model (McGonagle, 2016).

It has also been indicated that the cycle is not able to respond to the variety of needs of competitive intelligence: it works well for long-term strategy design tasks and technological surveillance, but is poorly adapted to the production of tactical intelligence on sales and marketing (McGonagle, 2007). In addition, this model is irrelevant facing a very common situation in the business world: a single person that has the role of both collector and analyst, and even that is the user of the intelligence. As a matter of fact, after the Cold War the intelligence cycle was considered dysfunctional and bureaucratic by those who systematized it, the US government intelligence services. This was due to the inherent problems it posed, such as the difficulty in dealing with uncertainty, identifying threats and emerging adversaries, working on unforeseen objectives, and facilitating communication between teams (Hulnick, 2006). Calof, Richards and Santilli (2017) have also concluded that the traditional model of competitive intelligence "appears to be inadequate to address the intelligence challenges arising from the speed of change in the environment, increasing data complexity, and the growth of international activities".

2.2 Searching for an alternative

However, the intelligence cycle model continues to be presented not as a model but as *the model* of universal validity. To correct this divergence between theory and practice, competitive intelligence should evolve towards more flexible and networked work models, as happened with strategic planning. It is a matter of considering competitive intelligence more as a process to be used by many instead of a function attended by a few at the service of a few (McGonagle, 2007).

Another relevant issue related to the model is where the intelligence function should be placed in the organizations. Solberg (2010) showed that intelligence often comes from an initial marketing research function in the marketing department, and develops to a special and separate department, where the practitioners build a strong organizational culture. The special departmental model of intelligence causes communication problems with top managers, so an advisory model to place a senior advisor to the CEO as the person responsible for the first and the last functions in the intelligence model has also been proposed: formulating the needs and delivering the results. Solberg (2010) discussed the pros and cons of these and other placement models

of intelligence function implemented in companies from an organizational perspective: the professional model, the top-down model, the integrated intelligence model, the down-up model, and the departmental model.

Within this search for alternatives, Prescott (1999) already suggested, expanding on an idea outlined in Prescott and Smith (1988), to explore the possibilities offered by project management when they suggested approaching competitive intelligence with a project focus: 'Competitive intelligence must be managed as a core business process. Projects are the basic building blocks of an action-oriented competitive intelligence program. That is, making the intelligence production process operational is a project'. That same year Vedder et al. (1999) also proposed that companies could choose not to have specific intelligence units and perform ad hoc intelligence work when necessary, managing them as projects. However, twenty years later neither Prescott nor other authors have developed an operational model of the process of intelligence production understood as a project, more aligned with the professional skills and the usual work procedures of the intermediate staff in in the departments with the highest demand and use of intelligence in companies (senior management, project management, R&D, marketing and operations).

Exploring new contributions to competitive intelligence from other disciplines, in this case engineering, is in accordance with the recent suggestions of Solberg (2016) about the scope for a new research agenda for intelligence studies in business. Solberg (2016) warned that the compartmentalization of competitive intelligence in the social sciences "has been to the disadvantage of its development as a discipline".

The application of project management techniques and tools to competitive intelligence has the following relevant implications for its practitioners: it helps to identify the diverse needs of stakeholders; it contributes to prioritize resources and ensure their efficient use; it allows practitioners to accurately budget in advance, as well as stay on schedule and keep costs and resources on budget; it improves communication between stakeholders; it reduces the risks of project failure; and, consequently, it increases the satisfaction of internal and external customers.

This aim is aligned with the suggestions of Calof, Richards and Santilli (2017) to break the traditional model of an in-house competitive intelligence unit and to move towards "a cross-pollination approach whereby others in the firm contribute to all intelligence activities", mainly in the selection of key topics and participation in the analysis. In this way, Alnouraki and Hanano (2017) have exposed the impact of business intelligence on modern and flexible organizations when it is integrated into corporate strategic management. They proposed a framework that facilitates their integration with a balanced scorecard methodology. Our proposal explores another option complementary to the strategic vision, more focused on the operational dimension of the companies. In recent practical research about the implementation of business intelligence in relation to the role of information systems integration and enterprise resource planning, Zafary (2020) suggests it is time to investigate "suitable approaches by a focus on the appropriate factors for successful business intelligence implementation and by a comparative analysis of ways to boost business intelligence preparation".

In the meantime, competitive intelligence can support the following plans and activities of project management as described in The PMBOK® Guide (2017, 6th ed.): identification of stakeholders (point 13.1) and monitoring of their engagement (13.4); planning of risk management, specifically the identification of risks, the qualitative and quantitative risk analysis, the monitoring of risks and the planning and implementation of risk responses (11.1;11.2,11.3;11.4; 11.5; 11.6; 11.7); and planning of procurement management (12.1).

The proposal of this project management approach to competitive intelligence is founded in the comparison of the similarities and differences of the two disciplines in various categories (nature, scope, practice, process, recipients, and human resources) and, therefore, what they can learn from each other, as shown in Table 1. There is an important coincidence in the nature, the main objectives, and the recipients of both disciplines, with the relevant exception that the IC is also focused on understanding the external environment and not only on supporting managerial decisions and decision-making, as pointed out by Solberg (2016). Obviously, there are differences in the processes, but these are not obstacles to collaboration.

Table 1 Comparison of competitive intelligence and project management (prepared by the authors).

	Competitive Intelligence	Project Management
Nature		
Actionable knowledge.	X	X
Look for suitable results, not for generic knowledge.	X	X
Focus on risk reduction.	X	X
Search opportunities.	X	
Scope		
Enrich the intellectual capital of the organization.	X	X
Principal focus actually to support strategic decisions.	X	
Seeks knowledge about the environment in which organizations develop their activity.	X	
Principal focus actually to accompany development of operations.		X
Practice		
Most common practice actually in companies.		X
A standardized practice.		X
It is exercised in a formal or informal way.	X	
Process		
Consists of a series of processes whose outputs constitute the following process inputs.	X	X
Continuous and repetitive transformation process of information and knowledge articulated in a series of phases.	X	
Temporary effort with a specific beginning and end that is carried out to create a product, service or unique result vs. cyclical intelligence process.		X
Determined by the triangle constituted by the variables scope, time, and cost; fixed all of them, any modification of a variable necessarily implies the modification of the other.		X
Continuous monitoring and documentation exercise that allows to maintain a high control over what is done and its effects.		X
Recipients		
End users are the key decision makers.	X	X
Managers and directors of the companies have significant responsibilities in relation to the objectives, plans and actions of the design and planning of the processes.	X	X
The interaction between producers and users is complex, but they try to build communication channels and information flows.	X	X
Communication and activity processes between stakeholders are clearly established.		X
Human resources		
Highly specialized competences.	X	
Common skills of managers and middle managers.		X
Specialized director in this field is a common place in the organization chart on companies.		X
Frequently outsourced.	X	

3. DISCUSSION

3.1 Intelligence production and dissemination is a project

The five groups of processes of project management are initiation, planning, execution, monitoring and control and closure (Figure 2). Consequently, the main processes for carrying out a competitive intelligence project should correspond to each of these groups. The initiation processes consist of the identification of intelligence and information needs based on the intelligence requirement received and the realization of the project's constitution. The planning process corresponds to the drafting and approval of the management plan. The execution processes consist of two complementary and interdependent processes: the collection of reliable and credible information and the analysis and evaluation of information. And the closing process corresponds to the dissemination of knowledge and the protection of information and intelligence created.

The management of the competitive intelligence project would include planning,

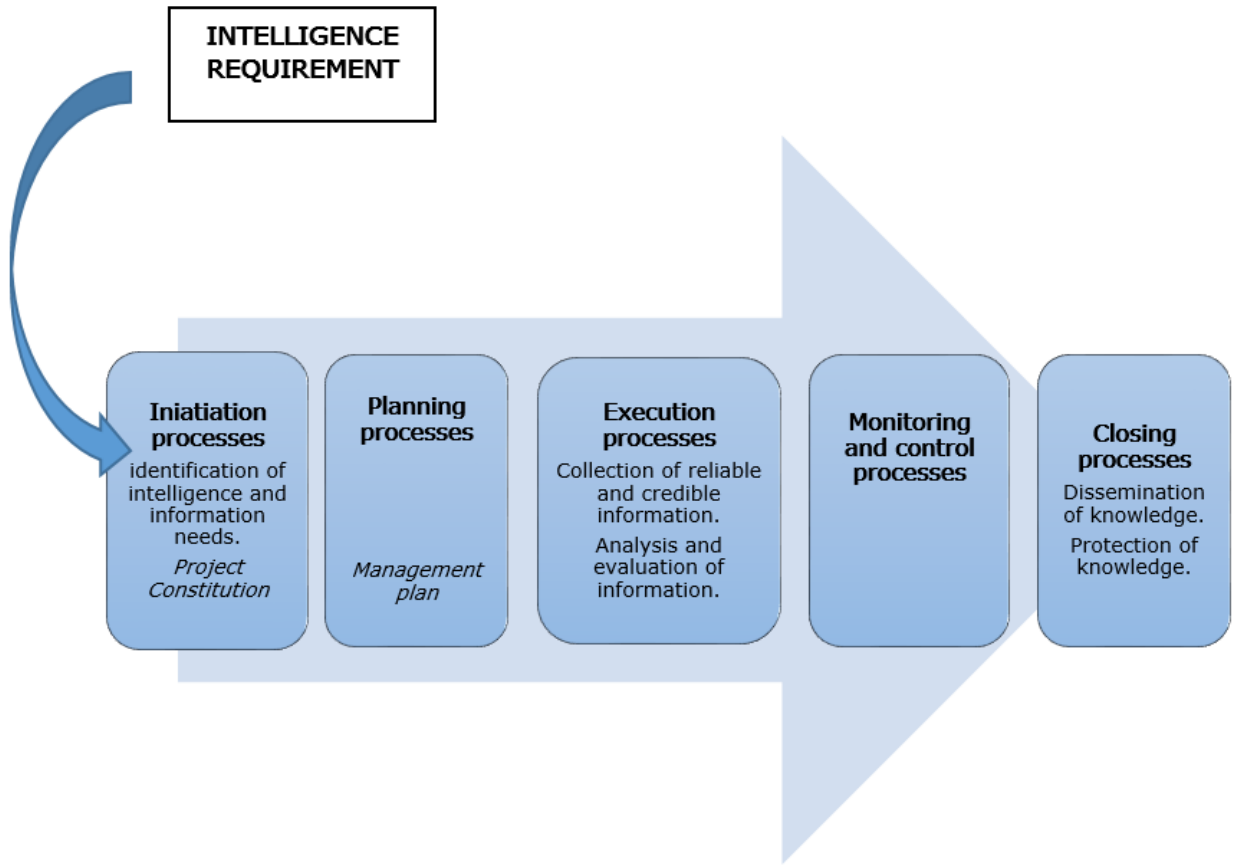

Figure 2 Competitive intelligence project management (prepared by the authors).

organizing, monitoring, controlling, reporting and taking the pertinent corrective actions of all the project processes that are necessary in a continuous way. The execution of an intelligence project should consider at least the following aspects: objectives and expected results, tasks to be performed, necessary material and immaterial resources, milestones that must be met (including start and end dates), formal revisions to evaluate the progression of the project, identification and risk management, control and documentation of results and changes and, finally, necessary support activities.

The organizational structure of a competitive intelligence project should be established in accordance with the requirements and policies of the organization and the specific conditions of their projects. The experience of previous projects, if any, should be used to select the most appropriate organizational structure. It should also be designed in a way that encourages communication and collaboration among all participants. The competitive intelligence project team should have at its head two key figures: the chief competitive intelligence officer (CCIO) of the organization and the project managers of the various intelligence projects.

3.2 The team

The chief competitive intelligence officer of the organization must actively participate in the management of intelligence projects:

- In the initiation phase they lead the beginning of the project, collect the requirements, are the spokesperson before the client (internal or external) and the highest authority for the project, draw up the constitution minutes and names the competitive intelligence project manager, guaranteeing the alignment of the objectives with the strategy of the company.
- In the planning phase, they facilitate the work with the competitive intelligence project manager and the team, assigning them the necessary time, means and information.
- In the implementation and follow-up and control phases, they supervise the competitive intelligence project manager and once again exercise the role of project leaders before the management, resolving

conflicts that are outside the competence of the project manager, approving the changes and ensuring the fulfilment of the goals and objectives.
- In the closing phase they approve the deliverables before being sent to the client and ensure the administrative closure of the project.

When a situation arises with multiple projects in parallel, the chief competitive intelligence officer must proceed to organize the integrated management of the project portfolio. To do this, they will consider aspects such as the alignment with priorities according to the strategy, the policy and the established objectives; the balance between short and long-term projects, between low- and high-risk projects, etc.; the global supervision of the progress of the projects, taking into account the impact of the evolution of the internal and external context during its execution; and the optimization of shared resources.

The chief competitive intelligence officer entrusts the management of intelligence projects to the managers of intelligence projects, people of recognized experience and prestige who assume the leadership of the work team (normally multidisciplinary) that can be of a temporary nature and even be outside of the organization (e.g. university departments, technology centres, intelligence companies). Depending on the organization, the intelligence manager should identify and coordinate one or several project managers corresponding to different markets, activities and technology domains.

The competitive intelligence project manager plans and organizes the work, makes decisions, supervises and checks the execution of the project and controls and creates commitment with the team, among other tasks. Their operational responsibilities include to:

- Design and develop the processes of initiation, planning, execution, monitoring and control and closure of the competitive intelligence projects assigned.
- Determine the objectives and requirements of the client and stakeholders in the project, as well as delimit the scope and control of its execution throughout the life cycle of the project.
- Determine the deliverables and validate this information together with the client.
- Gradually transform high-level information into detailed action plans throughout the life cycle.
- Prepare the project management plan and all subsidiary plans that are necessary.
- Constitute and direct the project team to meet the objectives.
- Prepare and document descriptions of the positions or functions of the team members and other important actors for the project, including attributions of responsibility and authority.
- Lead and ensure the execution, monitoring and control of assigned projects, controlling and documenting possible deviations and establishing the necessary corrective measures.
- Control project documentation.
- Coordinate with other departments and processes of the organization to ensure the effective progress of the project.
- Anticipate the changes in the projects and implement the necessary processes to manage and control these changes.
- Advise the chief competitive intelligence officer in the establishment of e.g., strategies and budgets, and respond to technical and organizational issues related to project management.
- Review the fulfilment of objectives, action plans and indicators of the projects, reporting the results to the chief competitive intelligence officer.
- Evaluate the success of the projects assigned in relation to the quality of the service or product, the deadlines, compliance with the budget and the degree of customer satisfaction, considering the objectives and requirements documented and approved by the client.
- Document and reflect on the lessons learned.

The management of intelligence projects imply the creation of ad hoc teams with the participation of specialized technicians in the search, collection and analysis of information. These processes can involve a large amount of knowledge (e.g. technical, legal, intellectual property, economical, and/or sociological), so total or partial subcontracting will be at the discretion of the organization. The processes and associated activities can also be performed by a single technician based on the size and means of the company.

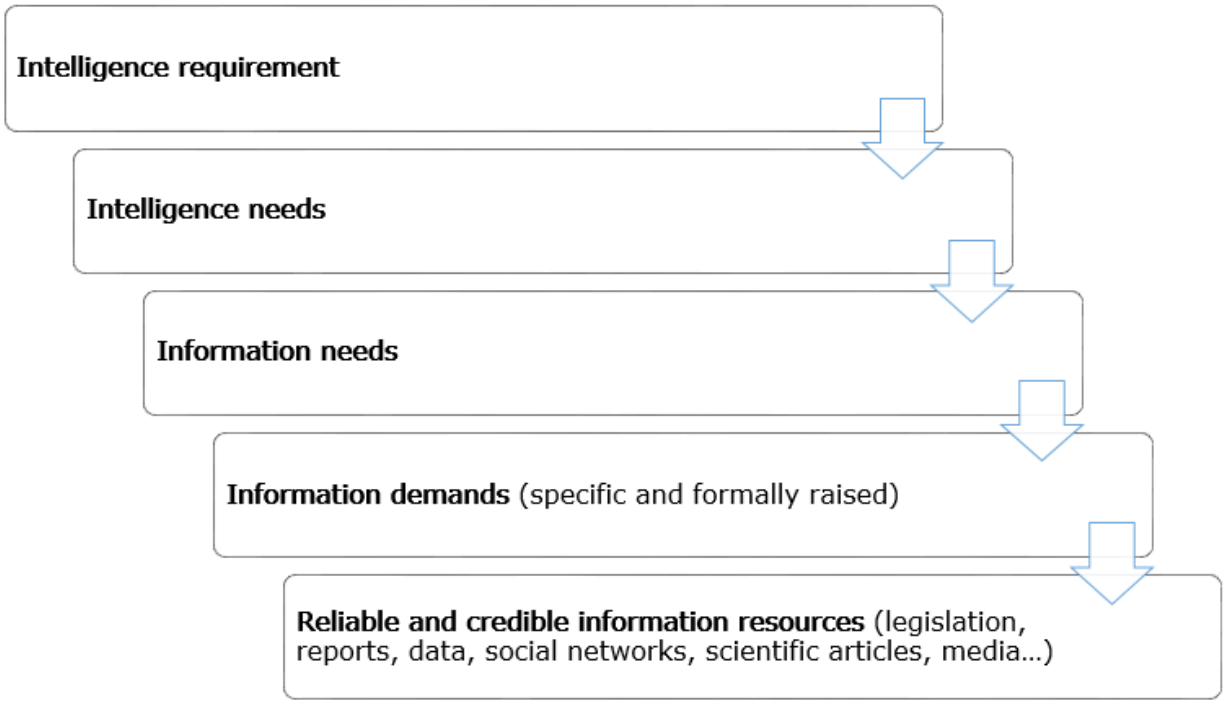

Figure 3 From intelligence requirement to information resources (prepared by the authors).

3.3 Initiating processes

A competitive intelligence project is activated with the approach of an intelligence requirement by the chief executive officer (CEO) of the organization or a functional unit. Each intelligence requirement or group of related requirements generates a specific intelligence project with its own plan, means, processes and unique actions.

The requirements can be general and prolonged in time or specific and singular. Applications from functional areas that express needs of the processes (e.g. knowing the activity of a competitor and making a prospective of their intentions) as well as monitoring critical issues of the environment will be addressed. Intelligence requirements may originate as a result of the evolution and different applications of the products, processes, materials and technologies based on the organization or the demands expected or expressed by the interested parties or external to it. Likewise, they may arise due to the socioeconomic, legislative, normative or project evolution or actions of the competition.

The chief competitive intelligence officer will evaluate the intelligence requirements to discard, promote, prioritize and organize the projects that it considers to be of the most strategic value given the available means. The results will be validated with the CEO of the organization. The methods and criteria for the evaluation and prioritization of the requirements and, therefore, of the project, will integrate the needs of the users and other interested parties, the alignment with the strategy of the organization, the technical and economic viability, the expected result, legality, and sustainability. Once the requirements have passed this first evaluation according to general strategic criteria, there is a second criterion based on factors weighted and previously established by the chief competitive intelligence officer. The selection procedures to be used in this phase can be qualitative (e.g. a weighting matrix) or quantitative (e.g. NPV, IRR).

Initially, requirements that can be satisfied in a better way by other processes of the organization (e.g. market studies) will be redirected to them. Requirements that involve only basic information on a specific topic will also be discarded, but not before advising the plaintiff where and how to obtain it in the most effective and efficient manner.

The main process of initiating a competitive intelligence project is the conversion of the intelligence requirement that activated it into intelligence needs, which will be specified below as information needs that will subsequently lead to specific information demands (Figure 3). The conversion of intelligence requirements into intelligence needs must consider both the foreseeable use

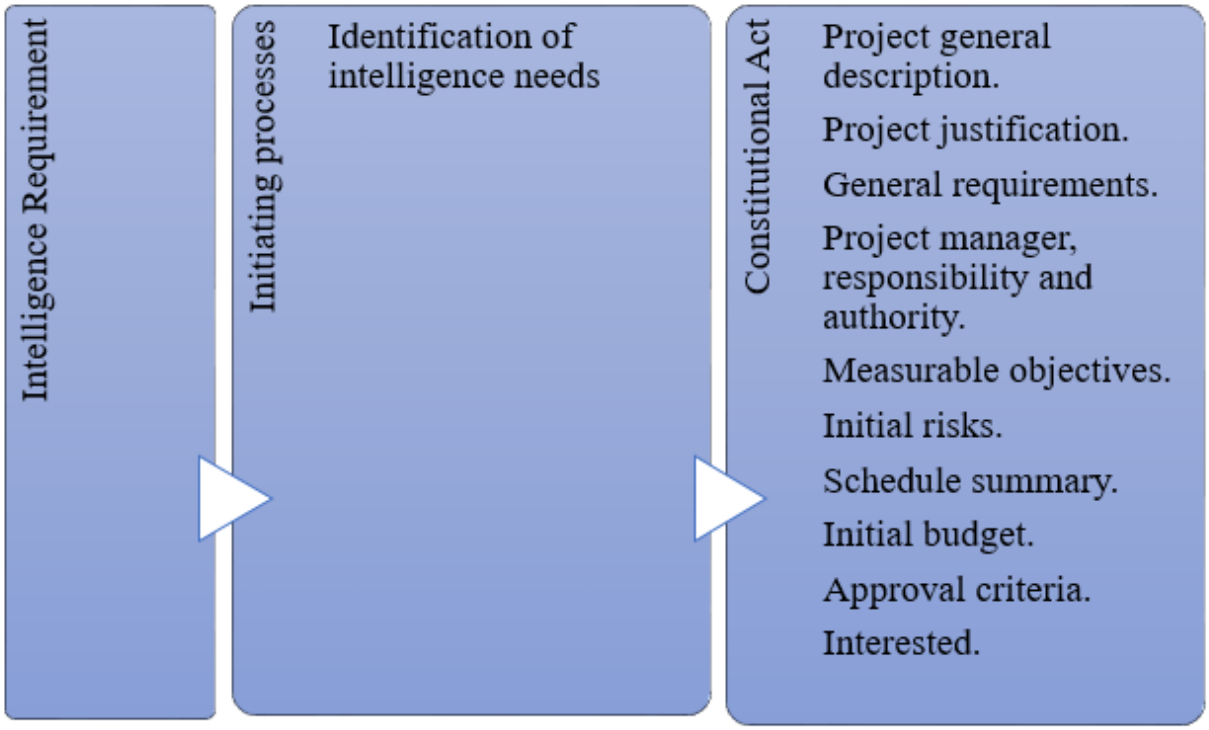

Figure 4 Initiating processes (prepared by the authors).

and the final recipients of the intelligence produced.

For the conversion of the intelligence requirement into the need for intelligence, the project manager must always bear in mind that users need intelligence to apply it, so they mainly seek the necessary, rather than a lot of information, through a simple and powerful process to achieve benefit from its use. As the end of the intelligence process is to respond satisfactorily to the needs of your client, the participation of the latter in the determination of intelligence needs from the general requirement is highly recommended for the success of the process. The intelligence project manager will assess, depending on the case and the circumstances, the need for the user to participate also in the formulation of information needs. In any case, it is recommended that those responsible for the strategic processes of the organization participate actively in the evaluation, validation and prioritization of the detected intelligence needs.

The intelligence project manager is also responsible for transforming the identified intelligence needs into information needs. If the project has a team it will get support from the analysts for this work. Each information need will give rise to different demands for information, of a more specific nature, which will be raised and expressed formally. The basic principle that must be followed is that generating concrete questions will lead to precise answers. Procedures will be devised to propitiate the formulation of information needs and their upwelling as conscious needs capable of being formalized as demands, expressing themselves in a suitable way to interrogate the sources of information.

The start-up processes will be included in an act of constitution of the competitive intelligence project, with the following contents: general description of the project, justification, general requirements, director (indicating responsibility and authority), measurable objectives, initial risks, summary of the schedule, budget initial, approval criteria and interests.

3.4 Planning processes

The planning processes establish the scope of the project, determine, describe and review the objectives and goals of the project, and define the course of the actions necessary to achieve the objectives. The result is the project management plan, whose degree of detail depends on factors such as the magnitude and complexity of the project. Its design will:

- Ensure by the chief competitive intelligence officer that all the necessary means are available to complete the

project, agreed upon and approved by the chief executive officer and all involved.
- Identify the participants involved in the execution of the project, mainly those with identified information and skills in documentation. This should define the necessary competence in terms of training, skills and experience of the personnel working on the project.
- Define the support roles, when required for the implementation of the project (e.g. information systems, information security, and logistics).
- Make sure that the organizational structure of the project is adequate.
- Encourage effective and efficient communication and cooperation among all project participants.

All agreements, including informal ones, that affect the performance of the project should be formally documented.

3.5 Executing processes

The execution processes complete the work established in the project management plan. The most characteristic aspects of competitive intelligence projects are the steps that include obtaining of reliable and credible information

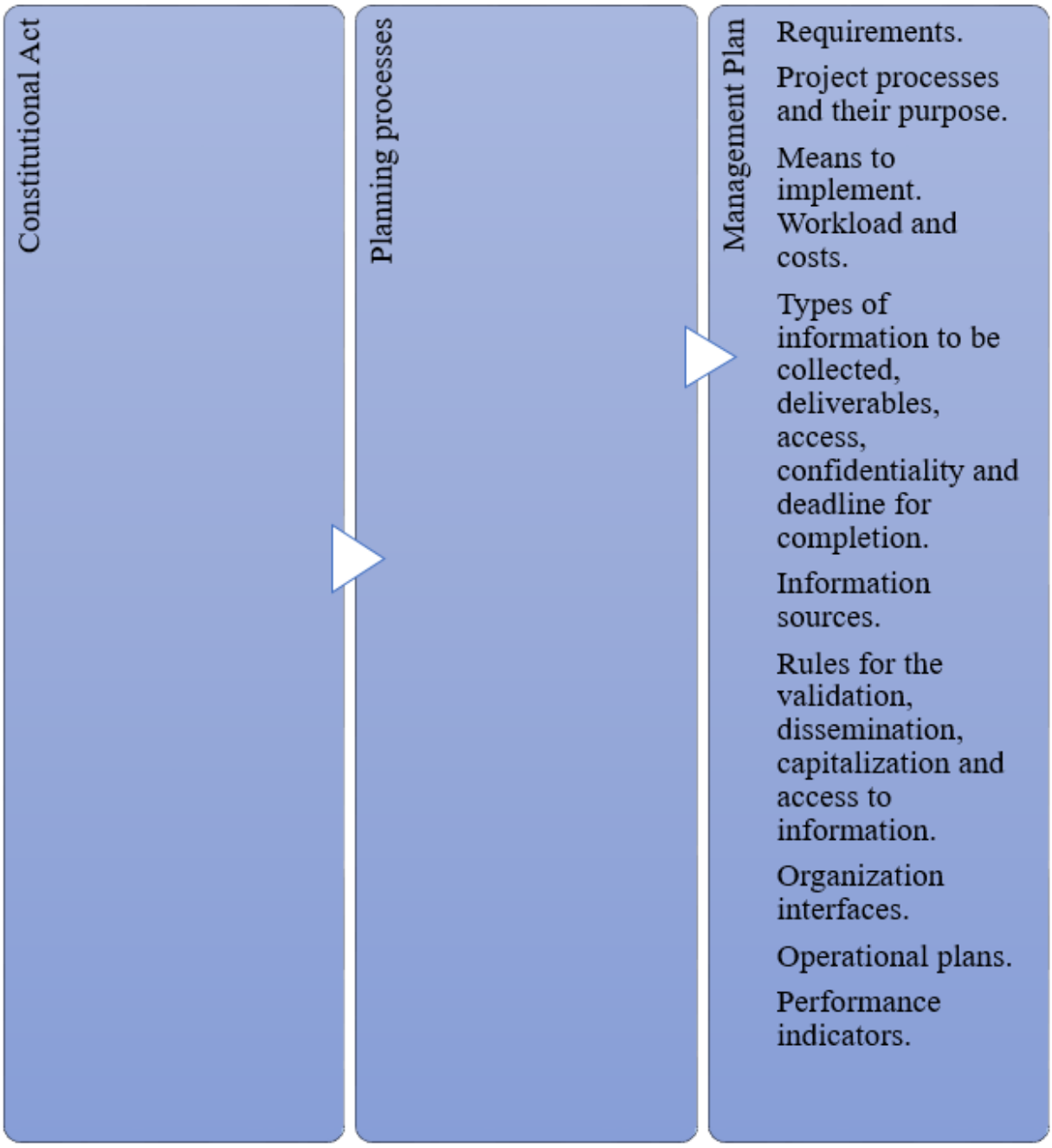

Figure 5 Planning processes (prepared by the authors).

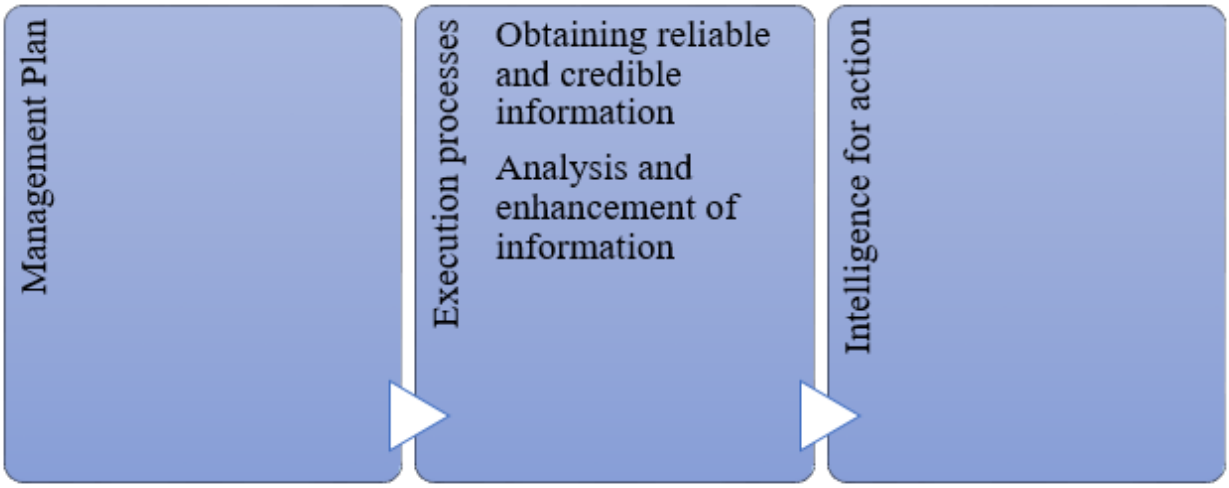

Figure 6 Executing processes (prepared by the authors).

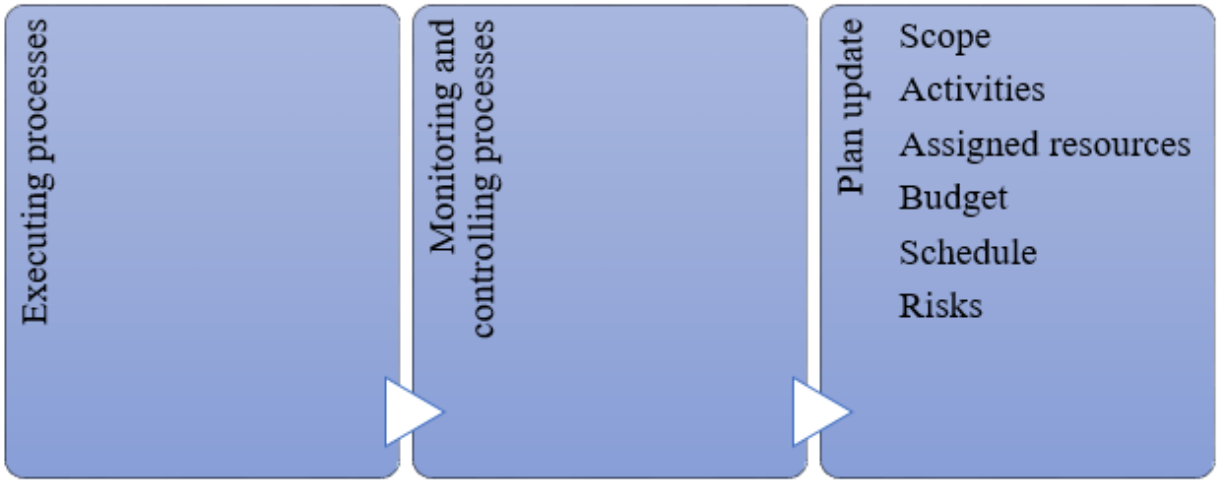

Figure 7 Monitoring and controlling processes (prepared by the authors).

and the analysis and evaluation of the information.

Information demands will be resolved during the process of obtaining information. They are satisfied by identifying and locating heterogeneous information sources that are public access, free or paid, to create a repository with the most appropriate material, consisting of information extracted from documentary or statistical databases, raw material price lists, directories of companies, academic publications, web pages, and social networks.

Human resources are another asset that is highly sought after and valued in intelligence projects: these include clients, employees, competitors, suppliers, market analysts, journalists, shareholders, and experts. Their participation is necessary in most intelligence projects. Hence, the chief competitive intelligence officer, with the collaboration of project managers, must be concerned with creating, activating and using a network of internal and external informants to collect information. When using these sources, it is very important to document the information collected, to facilitate its later use and analysis (e.g. minutes of meetings with suppliers or customer visit reports).

It is advisable to start with the collection of information from open sources. This starts from the premise that expert professionals are available in this task, because it is cheaper, simpler and helps to limit the information to be collected by human sources, and then, if it is not necessary, to resort to them. On the other hand, the use of human resources may involve legal risks if not done correctly (e.g. it may be illegal for former workers of some companies to provide relevant information if they signed confidentiality agreements at the time), so it is recommended to take extreme precautions in

this regard and systematically resort to the safest sources.

The user can also provide information for the production of intelligence, because their knowledge of the organization, the environment and their experiences are fundamental inputs for the analysis. The user can indicate and help evaluate sources of information, can facilitate access to their personal contacts and can produce very useful documents during the performance of their activities.

The information retrieved must be validated to discriminate which data contribute to satisfy the information requirements formulated, in terms of reliability and credibility. The ultimate goal is to find time-pertinent, relevant and useful information to solve the user's intelligence needs. This will make it easier to determine if sufficient and quality information is already available to proceed in their integration and analysis, or if the information gathering process should continue.

It is convenient to document the processes of searching for and selecting information. In particular, the recovery strategy follows and indicates, keywords, descriptors, operators used, geographical or temporal segmentation.

When the needs raised require a deep analysis, the information obtained is put to use for decision-making through three activities. First, we proceed to integrate data from different sources in order to create a whole of greater relevance and scope than that covered by each information separately. Next, an analysis of that information is carried out to determine what information is accurate and relevant, to put it in context and establish relationships to understand the subject investigated. Finally, these data are interpreted to achieve an understanding of the phenomenon and to forecast its possible consequences and evolution. The enhancement may require re-activating processes to obtain information, so procedures must be established to ensure the continuous communication between the leaders of both tasks.

Effective decisions are based on the analysis of data and information. This information processing can include both qualitative and quantitative techniques. As a result, we obtain formal information that can be complemented with other information of an informal nature (e.g. comments from a client or provider, or answers in an interview) and even with subjective assessments. There is a wide range of methods and analysis techniques. The person in charge of the competitive intelligence must establish procedures that minimize and guarantee the control of possible biases that may occur during the analysis.

3.6 Monitoring and controlling processes

The monitoring and control processes ensure compliance with the project in terms of time, cost, quality, anticipating problems, deviations and facilitating the adoption of corrective and preventive measures. If necessary, these processes will require the modification of the initial plan.

3.7 Closing processes

The closing processes are carried out to complete all the activities of the competitive intelligence project and formally terminate it.

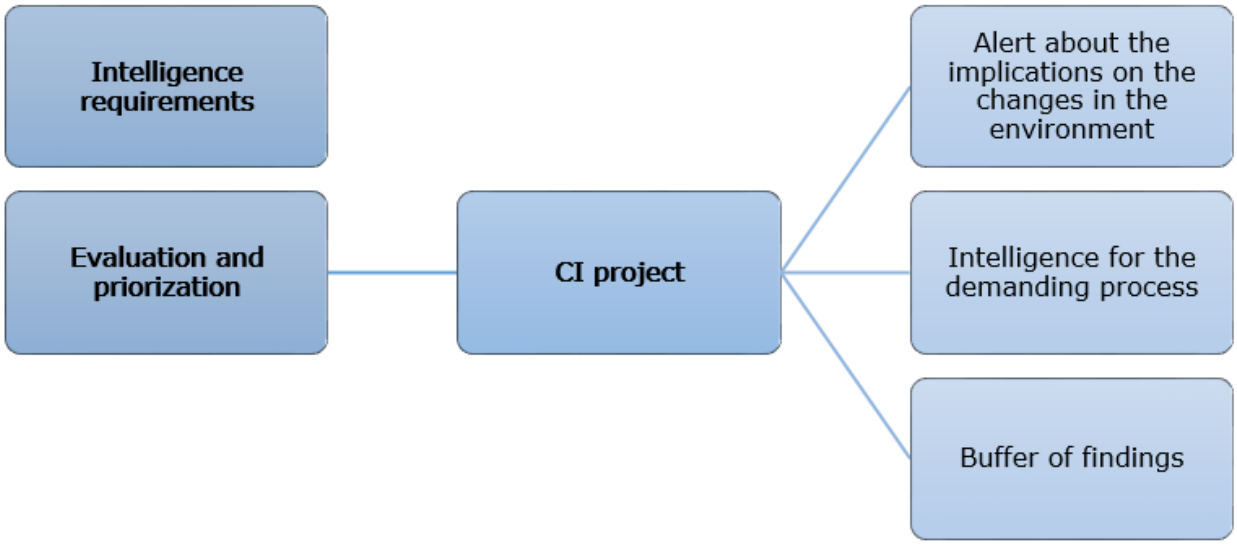

Figure 8 Inputs and outputs of a competitive intelligence project (prepared by the authors).

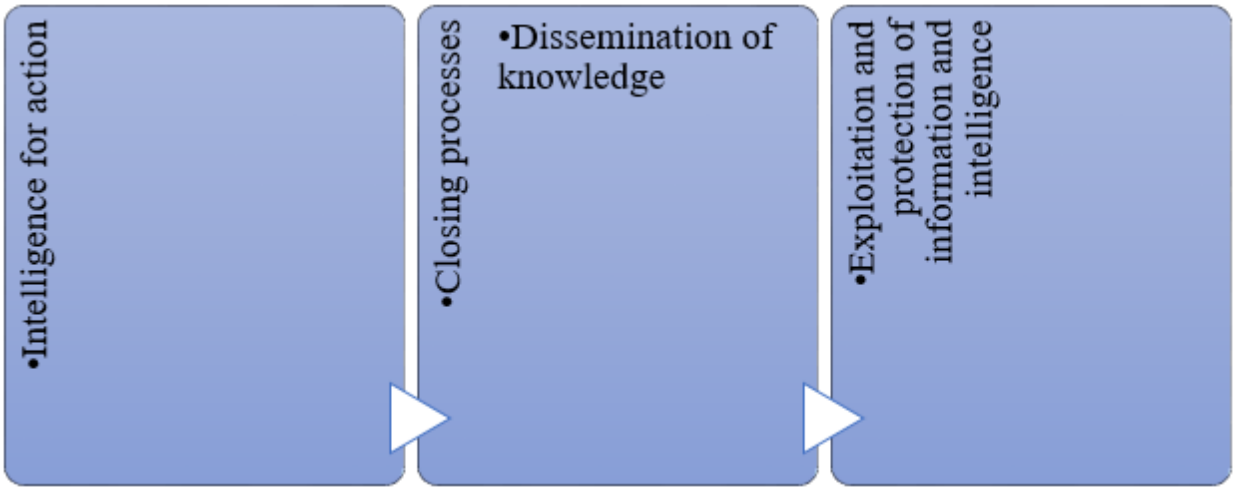

Figure 9 Closing processes (prepared by the authors).

The most important closing process for competitive intelligence projects is the dissemination and protection of the information obtained and the intelligence created and transmitted.

The results of the competitive intelligence project will have two forms. The first is called 'alert' and deals with the implications of the transcendental changes in the environment for the strategy and the plans of the organization. The second is 'proposed decision' for intelligence requests emanating from the different functional areas. Regardless of whether they are contemplated in the competitive intelligence project, all findings that may be of interest, presumably for other projects, should be preserved, forming a repository of strategic information or a buffer of findings (Figure 8).

The effort of competitive intelligence is not a process of compilation but of socialization of information and available knowledge. The knowledge created is not intelligence until it is transferred successfully to its recipient. In any case, the communication of the intelligence product must be carried out through secure channels and maintain the proper level of secrecy or confidentiality.

The timing of the dissemination of intelligence products depends on the nature of the end user, the intelligence needs to which it responds, the thematic or geographical coverage of the matter, the availability of new information or whether the organization is in a crisis situation.

The chief competitive intelligence officer must establish procedures to identify those aspects of the intelligence provided that require clarification or expansion, have been more relevant to decision making, are relevant for implementation by users, have contributed more value to the business process with which it is linked or have generated new intelligence needs. When the intelligence transfer has been effective it can lead to the beginning of a new process of intelligence production, destined to solve new needs generated from the achieved results and the assimilation of the intelligence communicated.

4. CONCLUSIONS

The main conclusion is that companies will be able to implement a documented project management methodology that will establish a detailed plan for each intelligence project, with clear objectives and deliverables that will be monitored as it is executed. The methodology will include the management of the processes of obtaining reliable and credible information, and of analysis and enhancement of information as well as dissemination and protection of knowledge.

The proposal here could be an alternative to the departmental-based intelligence cycle model more aligned with the organizational culture and the usual operational practices of companies. This traditional model is founded on the design and deployment of projects with a specific beginning and end that are carried out to create a product, service or unique result. The combination of systematic activities and project management that arise in response to specific proactive and reactive intelligence needs favours the prediction of opportunities

and timely solutions of possible problems, guaranteeing the necessary permeability of organizations against the environment and avoiding the indiscriminate dissemination of information.

Likely, this project management approach to competitive intelligence will contribute to the use of competitive intelligence in all business processes and managerial functions, and not only in strategic decision making. Overcoming departmental structures as unique ways of organizing intelligence processes helps to break down cultural and, above all, organizational barriers. Because of this, and considering the development of intelligence as a project aligned with project management, this methodology facilitates its understanding by managers and their integration into the general dynamic as a subproject of support linked to a general project of creating a product or service. The only goal should be to ensure that the relevant information about the environment has been captured, evaluated, analysed, contextualized and made available to decision-makers at the right time, which will undoubtedly contribute to improving their competitive position.

The latter will also facilitate communication between collectors, analysts and users, and, in particular, the participation of managers involved in the management of a project in the processes of obtaining and analysing information, after equipping them with basic or advanced skills through in-company training. Sometimes, competitive intelligence is practiced spontaneously on an individual basis, in response to an urgent need to gather information and make decisions in changing environments. In fact, almost all companies produce intelligence in some basic way, whether or not they are aware of it.

This model of production and transfer of intelligence presented differs from the sequential approach in the form of a cycle developed more than sixty years ago, which underlies the Spanish technical standards UNE 166006 and UNE-CEN/TS 16555-2. For the validation of this proposal, it is necessary to conduct experimental implementations and case studies in companies using a project management methodology and their assessment by future academic studies.

In conclusion, it is necessary to think and act in competitive intelligence more with the entrepreneurial and project focused culture of a business manager than with the bureaucratic and secret procedures of an intelligence officer in an intelligence service. Different intelligence tribes need to explore on their own and innovate techniques for their specific functions in the diverse organizations where they serve.

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Journal of Intelligence Studies in Business
Vol. 10, No. 3 (2020) pp. 24-37
Open Access: Freely available at: https://ojs.hh.se/

An examination of the organizational impact of business intelligence and big data based on management theory

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Received 2 June 2020 Accepted 26 October 2020

ABSTRACT Big data and big data analytics have been considered to be a disruptive technology that will rebuild business intelligence. The purpose of this study is to enrich the literature on the organizational impact of business intelligence and big data based on management theory. While the majority of the organizational theories have had research dedicated to enhance the understanding of the impact of business intelligence and big data on organizational performance and decision-making, the research lacks scholarly work capable of identifying the other main organizational outcomes. To achieve this goal, a semi-systematic literature review was carried out to find all studies related to the research topic. Then, an analysis was conducted to understand the use of the organizational theory in accordance with business intelligence and big data. Finally, a grouping was developed to assign each organizational theory the related impact. The main findings of this work, after examining thirty-three related organizational theories, was that there are other important organizational impacts including innovation, agility, adoption, and supply-chain support.

KEYWORDS Big data, big data analytics, business intelligence, management theory, organizational theory

1. INTRODUCTION

With the data explosion from clicks, sensors, and technological innovations, new fields have become more and more in need, especially in the field of big data (BD; Mazzei, & Noble, 2020). Every person is currently considered a "data generator" and organizations become "information processors" (Mazzei, & Noble, 2020).

Most of the scholars agree on the fact that BD enables organizations to create entirely new innovative products, and new business models. They also agree on the fact that BD helps achieving competitive advantages (Holmlund, Van Vaerenbergh, Ciuchita, Ravald, Sarantopoulos, Villarroel-Ordenes, & Zaki, 2020; Sadovskyi, Engel, Heininger, Böhm, & Krcmar, 2014).

BD still represents, for a large number of companies, a tool that can enhance their reporting and monitoring capabilities (Bischof, Gabriel, Rabel, & Wilfinger, 2016). For a limited number of companies, BD represents an opportunity to create innovative business models (Mazzei, & Noble, 2020). In the latter case, BD can be integrated within the company's structure, processes, infrastructure, technologies and strategy (Bischof, Gabriel, Rabel, & Wilfinger, 2016).

Scholars argue that there is a close relationship between BD, business intelligence (BI), and big data analytics (BDA) because BI provides the methodological and technological capabilities for data analysis (e.g. Llave, 2018; Sun, Zou, & Strang, 2015). BI supports a firm's decision-making with valuable data, information, and knowledge (Alnoukari &

Hanano, 2017), hence BDA can be seen as a part of BI (Sun, Zou, & Strang, 2015). In addition, both BI and BDA share some common tools supporting the decision-making process. Both BI and BDA are common in emphasizing valuable data, information, and knowledge and both involve interactive visualization for data exploration and discovery. BI is currently based on four technology pillars: cloud, mobile, big data, and social technologies, which are also supported effectively by BDA as a service and technology (Passlick, Lebek, & Breitner, 2017; Sun, Zou, & Strang, 2015).

From the data viewpoint, knowledge discovery is the core of BDA and BI systems (Sun, Zou, & Strang, 2015). Jin & Kim (2018) consider BI's "raw data" to have been expanded into "big data" due to the advanced technology capability. Therefore, it is logical to consider that BI, BD, and BDA are not independent concepts. Consequently, it is beneficial to integrate all of them into an integrated DSS, incorporating all processes from data gathering to data analytics and insights to decision making (Calof & Viviers, 2020; Jin, & Kim, 2018). However, analytical models based on single data sources may provide limited insights that consequently lead to biased business decisions. Using multiple and heterogeneous data sources can provide a holistic view of the business and result in better decision-making (Fan, Lau, & Zhao, 2015). Fan et al. (2015) conclude that big data and its applications on BI have great potential in generating business impacts.

According to Braganza et al. (2017), BI and BD are more than technology, and to be fully effective, they should be incorporated into corporate strategy (Calof, Richards, & Santilli, 2017). Many current researches highlight the need to tackle the strategic incorporation of BI and BD technological development, and the link between BI, BD and SM theories (Mikalef, Pappas, Giannakos, Krogstie, Lekakos, 2016). Wang et al. (2018) address the lack of understanding of the strategic implications of BD by examining the historical development, architectural design, and components functionalities of BD analytics.

Organizational theory (OT) provides the basis to understand and define all of an organization's activities, processes, and environments (Sarkis, Zhu, & Lai, 2011). While BD technologies have been developed rapidly, academic research on the use of OT to explain BD impact on the organizational level is still in its infancy. Recent researches have started to highlight organizational-level outcomes after applying big data initiatives (Braganza, Brooks, Nepelski, Ali, & Moro, 2017; Côrte-Real, Oliveira, & Ruivo, 2019; Mikalef, Pappas, Krogstie, & Pavlou, 2020; Wang, Kung, & Byrd, 2018). Fiorini et al. (2018) argue that certain organizational theories support the findings about the implications of big data in an organizational context.

Therefore, considering the importance of OT to better understand the implications of BI and BD in an organizational context, the lack of an all-encompassing view of the BI and BD organizational impact based on OT, and the emerging role of BI and BD as tools for organizational innovation and transformation, this study will consider the following research question that guides this work: how can OTs be used to provide an all-encompassing view of the BI and BD organizational impact?

Thus, in light of this, the main goal of this study is to analyze recent literature on OT related to the BI and BD domains, and to find the main organizational impacts of BI and BD based on OT.

To achieve this goal, a semi-systematic literature review was carried out to find all studies that relate OT with BI and BD domains. Then, an analysis was required to understand the core use of each OT in accordance with BI and BD domains. Finally, a grouping was conducted to assign each OT its related impact.

This work is inspired by recent related studies tackling OT with BD including Walls & Barnard (2020), Fiorini et al. (2018), Hazen et al. (2016), and Erevelles et al. (2016).

The remainder of this paper is organized as follows. The next section presets the research method. Section 3 looks at the theoretical background of BD and OT. Section 4 presents the core work of this study by analyzing the application of OT on BI and BD, then identifying the list of all related OTs, and then groups the resulting OTs according to the BI and BD organizational impact. Section 5 discusses the study's findings and provides discussions about the results. The last section explains the study's outcomes as well as the conclusions drawn from the findings, the study implications and limitations, and finally the suggested future research directions.

2. RESEARCH METHOD

Inspired by Sarkis et al. (2011) and Fiorini et al. (2018), this study revises literature on BI and BD, and highlights how management

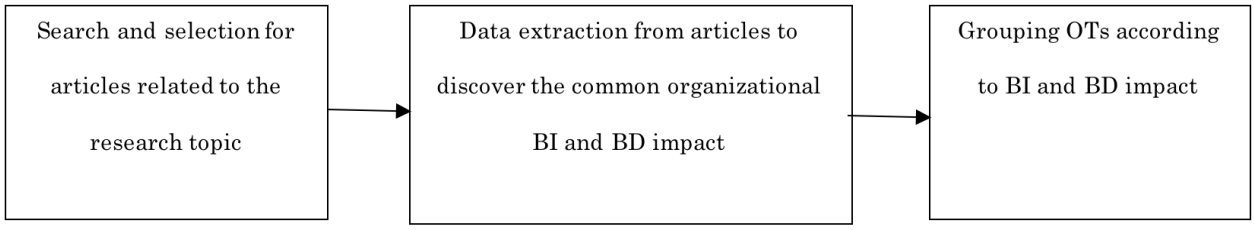

Figure 1 Steps for this study's semi-systematic literature review.

theory can be applied to enhance BI and BD research. The research method adopted was a semi-systematic literature review, as this approach is suitable for emerging topics such as BI and BD. The main purpose of a semi-systematic literature review is to provide an overview of the research area. The research questions can be broad, the research strategy may or may not be systematic, and the analysis and evaluation can be quantitative or qualitative (Snyder, 2019). This study uses this approach to classify the literature on the use of OTs with BI and BD domains, to understand this topic in a comprehensive perspective, and to highlight the research gaps on this topic. The three steps of our literature review are presented in Figure 1.

The first step was the definition of the research question as presented in Section 1. Based on the research question, the search and selection of articles was conducted based on the recent findings from Fiorini et al. (2018), which cover the literature till 2018, and the recent studies that have been published till 2020. The search for recent studies was carried out on the Scopus database. The final number of selected articles after a full reading was 65 articles that are closely related to the research question. These articles identify 33 OTs based on their application on BI and BD domains.

The second step was to conduct an in-depth reading and analysis of the papers to identify the contributions and the gaps for future research. All 65 articles were analyzed in detail according to how they have applied management theories to underpin the research.

The third and last step was to find the common organizational-level BI and BD impacts, and group the listed OTs accordingly.

3. THEORETICAL BACKGROUND

3.1 Big data

There is big hype around BD (Al-Qirim, Rouibah, Serhani, Tarhini, Khalil, Maqableh, & Gergely, 2019). BD is becoming an attractive field for scholars, practitioners, and policymakers around the world. However, BD is currently still in the preliminary stages. Therefore, BD is still complex due to its infancy as a field, and the limited understanding of what BD means for organizations.

BD is more than a technology (Braganza, Brooks, Nepelski, Ali, and Moro, 2017), and to be fully effective, it should be incorporated into organizational strategy (Mazzei, & Noble, 2017). Moreover, BD affects organizational culture (Gupta, & George, 2016); it converts firms to become data and evidence-based organizations (Braganza, Brooks, Nepelski, Ali, and Moro, 2017).

According to Al-Qirim et al. (2019), the convergence of IoT with BD and cloud computing has taken organizations to the next level of value creation.

Moving from 3 Vs into 5 Vs, and finally 7 Vs, our work adopts the updated definition of Fosso Wamba et al. (2015) of BD as "a holistic approach to manage, process and analyze the 7 Vs (i.e., volume, variety, velocity, veracity, value, valence, and variability) in order to create actionable insights for sustained value delivery, measuring performance, establishing competitive advantages, and becoming a source of innovation."

This work argues that BD initiatives provide value at several stages: knowledge, organizational performance, organizational agility and flexibility, value creation, innovation, competitive advantage, and decision-making.

3.2 Organizational theory

According to Sarkis et al. (2011) and Fiorini et al. (2018), defining and identifying OTs is not a simple task. Sarkis et al. (2011) defines OT as "a management insight that can help explain or describe organizational behaviors, designs, or structures". This definition is adopted for the purpose of this study.

Sarkis et al. (2011) argue that OT provides the ability to understand organizational activities, processes, and environments.

4. APPLICATION OF ORGANIZATIONAL THEORIES ON BUSINESS INTELLIGENCE AND BIG DATA DOMAINS

4.1 Organizational theories supporting business intelligence and big data

For the development of this theoretical study, bibliographical research was conducted, since it contributes to reflexive thinking that allows us to find new facts and relations.

With this effort, we bridge and extend the research on OT supporting BI and BD conducted by Fiorini et al. (2018) and Hazen et al. (2016), with the recent research in the field conducted by Walls & Barnard (2020) and Erevelles et al. (2016).

This study identifies thirty-three OTs based on their application on BI and BD domains. The following paragraphs provide an ordered list of these OTs, with a general description of each theory, and a list of BI and BD related studies:

1. Absorptive capability theory is the ability to recognize the value of new and external information, and use it for future commercial use (Walls & Barnard, 2020). Absorptive capacity can be a source of innovativeness, as it can be seen as a specific type of dynamic capability (Wang, Kung, & Byrd, 2018). BI and BD related studies include Braganza, Brooks, Nepelski, Ali, and Moro, 2017, Walls & Barnard, 2020, and Wang, Kung, & Byrd, 2018.
2. Actor-network theory considers organizations to be networks of heterogeneous actors. The theory addresses how these actors and organizations are constructed from the "bits and pieces out of which they are constructed" (Hazen, Skipper, Ezell, & Boone, 2016). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, and Hazen, Skipper, Ezell, & Boone, 2016.
3. Agency theory explains how to control the relationships in which one 'principal' delegates work to another, the 'agent' (Sarkis, Zhu, & Lai, 2011). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, Nocker & Sena, 2019, Sarkis, Zhu, & Lai, 2011, and Waller & Fawcett, 2013.
4. Contingency theory addresses the effect of the environment's uncertainties on organizations (Dubey, Gunasekaran, & Childe, 2018). BI and BD related studies include Dubey, Gunasekaran, & Childe, 2018, Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, Gupta, & George, 2016, and Waller & Fawcett, 2013.
5. Decomposed theory of planned behavior states that the behavioral intention is an antecedent of behavior and is determined by attitude, subjective norms and perceived behavioral control. In order to better understand the relationships between belief structures and the antecedents of intention, beliefs (attitude, subjective norms and perceived behavioral control) are decomposed into multidimensional constructs (Esteves & Curto, 2013). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, and Esteves & Curto, 2013.
6. Diffusion of innovation theory provides an understanding about the innovation diffusion process, and how and why new ideas and technologies are spread (Sarkis, Zhu, & Lai, 2011). Ahmad et al. (2016) examined how the innovative traits of BD can influence its successful implementation. Even more, it offers valuable insights into the characteristics of BI that influence its successful adoption. BI and BD related studies include Ahmad, Ahmad, & Hashim, 2016, Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, Sarkis, Zhu, & Lai, 2011, and Soon, Lee, & Boursier, 2016.
7. Dynamic capabilities view refers to the firm's abilities to maintain and adapt its internal resources to environment changes to maintain sustainability of competitive advantages (Alnoukari & Hanano, 2017). It refers to the capability of acquiring new ways of competitive advantage. It also involves continuous search, innovation and adaptation of firm resources and capabilities to uncover and tape new sources of competitive advantages (Alnoukari & Hanano, 2017). BI and BD related studies include Alnoukari & Hanano, 2017, Braganza, Brooks, Nepelski, Ali, & Moro, 2017, Chen, Preston, & Swink, 2015, Côrte-Real, Oliveira, & Ruivo, 2017, Dubey, Gunasekaran, & Childe, 2018, Erevelles, Fukawa, Swayne 2016, Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, Mikalef, Krogstie, Wetering, Pappas, & Giannakos, 2018, Mikalef, Pappas, Giannakos, Krogstie, & Lekakos, 2016, Fosso Wamba, Gunasekaran, Akter, Ren, Ji-fan., Dubey, & Childe, 2017, Gupta, & George, 2016, Hazen, Skipper, Ezell, & Boone, 2016, Lin & Kunnathur, 2019, Nocker & Sena,

2019, Prescott, 2014, Rialti, Zollo, Ferraris, & Alon, 2019, Shams, & Solima, 2019, Shan, Luo, Zhou, & Wei, 2018, and Walls & Barnard, 2020.

8. Ecological modernization describes a technology-based and innovation-oriented approach to environmental policy and politics (Sarkis, Zhu, & Lai, 2011). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, Hazen, Skipper, Ezell, & Boone, 2016, and Sarkis, Zhu, & Lai, 2011.

9. Evolutionary perspective focuses on innovation, learning and competitive advantages (Du, Huang, Yeung, & Jian, 2016). BI and BD related studies include Du, Huang, Yeung, & Jian, 2016, and Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018.

10. Expectancy theory considers that individuals' performance is in accordance with rewards or inducements (Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018). BI and BD related studies include Chang, Hsu, & Wu, 2015, and Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018.

11. Game theory applies analytical tools to predict, explain and prescribe what players with various degrees of rationality will do in specific situations (Liu, Shao, Gao, Hu, Li, & Zhou, 2017). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, Fu & Zhu, 2017, Liu, Shao, Gao, Hu, Li, & Zhou, 2017, and Liu & Yi, 2017.

12. Goal contagion theory explains how individuals automatically adopt and pursue a goal of another person's behavior (Aarts, Gollwitzer, & Hassin, 2004). BI and BD related studies include Aarts, Gollwitzer, & Hassin, 2004, Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, and Lee, Li, Shin, & Kwon, 2016.

13. Ignorance based view relies on the fact that "what we don't know (i.e. ignorance) is actually more than what we know (i.e knowledge)." In other words, ignorance enables knowledge (Erevelles, Fukawa, Swayne 2016). BI and BD related studies include Erevelles, Fukawa, Swayne 2016.

14. Information systems participation theory explains what parameters used for designing systems involve users' participation (Silva, 2015). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018 and Silva, 2015.

15. Institutional theory explains the pressure effects from external environments on an organization's adoptions of certain practices and actions (Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, Hazen, Skipper, Ezell, & Boone, 2016, Kwon, Lee, & Shin, 2014, and Waller & Fawcett, 2013.

16. Knowledge management theory defines the process of using the value generated by intellectual capital transfer, where this value can be viewed as knowledge creation, acquisition, and sharing (Alnoukari, Alhawasli, Alnafea, & Zamreek, 2012). BI and BD related studies include Braganza, Brooks, Nepelski, Ali, and Moro, 2017, Du, Huang, Yeung, & Jian, 2016, and Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018.

17. Knowledge-based view states that knowledge and related intangibles are sources to competitive advantages (Gupta, & George, 2016; Herden, 2020). BI and BD related studies include Côrte-Real, Oliveira, & Ruivo, 2017, Erickson & Rothberg, 2017, Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, Hazen, Skipper, Ezell, & Boone, 2016, Herden, 2020, and Gupta, & George, 2016.

18. Market-based view is a traditional approach to strategic management. According to this approach, an organization gains competitive advantages according to its industry attractiveness, and its relative positioning against competitors. Industry attractiveness is expressed by Porter's five competitive forces (Porter, 1980). BI and BD related studies include Bischof, Gabriel, Rabel, & Wilfinger, 2016.

19. Normalization process theory refers to the social processes through which new ideas and technologies are embedded within the working process. This theory fits well with macro approaches to innovation (Shin, 2016). BI and BD related studies include Shin, 2016.

20. Organizational information processing view states that effective utilization of data requires an appropriate, context-specific composition of information processing mechanisms (Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018). BI and BDA are considered important information processing mechanisms for organizations. They can reduce uncertainty and equivocality in the decision-making process (Kowalczyk & Buxmann, 2014). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, Hazen, Boone, Ezell, & Jones-Farmer, 2014, and Kowalczyk & Buxmann, 2014.

21. Practice based view focuses on practices that can create specific and actionable advice for practitioners while explaining firm behavior and the influence on organizational performance (Bromiley & Rau, 2014). BI and BD related studies include Wang, Kung, Wang, & Cegielski, 2018.

22. Resource based theory considers that resources are valuable, rare, inimitable, and non-substitutable; they are the main pillars of competitive advantages (Alnoukari, 2009). BI and BD related studies include Akter & Fosso Wamba, 2016, Akter, Fosso Wamba, Gunasekaran, Dubey, & Childe, 2016, Barbosa, Vicente, Ladeira, & Oliveira, 2018, Braganza, Brooks, Nepelski, Ali, and Moro, 2017, Cheah & Wang, 2017, Du, Huang, Yeung, & Jian, 2016, Erevelles, Fukawa, Swayne 2016, Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, Fosso Wamba, Gunasekaran, Akter, Ren, Ji-fan., Dubey, & Childe, 2017, Gupta, & George, 2016, Hazen, Skipper, Ezell, & Boone, 2016, Mazzei, & Noble, 2020, Mikalef, Krogstie, Wetering, Pappas, & Giannakos, 2018, Mikalef, Pappas, Giannakos, Krogstie, Lekakos, 2016, Nocker & Sena, 2019, Shan, Luo, Zhou, & Wei, 2018, Suoniemi, Meyer-Waarden, & Munzel, 2017, Waller & Fawcett, 2013, and Walls & Barnard, 2020.

23. Resource dependence theory states that organizations attempt to reduce others' power over them, often simultaneously trying to increase their own power over others (Sarkis, Zhu, & Lai, 2011). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, Hazen, Skipper, Ezell, & Boone, 2016, Prasad, Zakaria, & Altay, 2016, Sarkis, Zhu, & Lai, 2011, and Waller & Fawcett, 2013.

24. Service-dominant logic explains value co-creation between firms and customers. The theory considers service as the core component for economic exchange (Xie, Wu, Xiao, & Hu, 2016). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, and Xie, Wu, Xiao, & Hu, 2016.

25. Social capital theory provides the base for social networks; it premise is that the network provides value to its members by allowing them access to the network's social resources (Hazen, Skipper, Ezell, & Boone, 2016). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, and Hazen, Skipper, Ezell, & Boone, 2016.

26. Social comparison theory focuses on self-assessment by comparing individuals' own opinions and abilities with others (Lee, Li, Shin, & Kwon, 2016). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, and Lee, Li, Shin, & Kwon, 2016.

27. Social exchange theory assumes the existence of relatively long-term relationships of interest based on intrinsic and extrinsic benefits (Chang, Hsu, & Wu, 2015). It explains the motivational factors that lead managers to adopt BD solutions. Beneficial factors such as organizational rewards, reputation, and reciprocity encourage managers use BI effectively for BD solutions (Chang, Hsu, & Wu, 2015). BI and BD related studies include Chang, Hsu, & Wu, 2015, and Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018.

28. Sociomaterialism theory presents a balanced view by interlinking and enacting management, technology and human (Akter, Fosso Wamba, Gunasekaran, Dubey, & Childe, 2016). BI and BD related studies include Akter & Fosso Wamba, 2016, Akter, Fosso Wamba, Gunasekaran, Dubey, & Childe, 2016, and Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018.

29. Stakeholder theory suggests that companies produce externalities that affect both internal and external stakeholders (Wilburn, & Wilburn, 2016). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, Sarkis, Zhu, & Lai, 2011, and Wilburn, & Wilburn, 2016.

30. Systems theory states that organizations interact with their environment, thus, evolve constantly (Hazen, Boone, Ezell, & Jones-Farmer, 2014). BI and BD related studies include Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, and Hazen, Boone, Ezell, & Jones-Farmer, 2014.

31. Technological, organizational, and environmental framework states that the firm's three elements (technological, organizational and environmental) have the ability to impact organizational innovation (Chen, Preston, & Swink, 2015). BI and BD related studies include Chen, Preston, & Swink, 2015, and Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018).

32. Technology acceptance model explains how to encourage users to accept and utilize new technology (Soon, Lee, & Boursier, 2016). BI and BD related studies include Fiorini,

Seles, Jabbour, Mariano, Jabbour, 2018, Liu, Dedehayir, & Katzy, 2015, and Soon, Lee, & Boursier, 2016.

33. Transaction cost economics considers the efforts and costs required to complete the activity between buyer and seller (Sarkis, Zhu, & Lai, 2011). BI and BD related studies include Akter & Fosso Wamba, 2016, Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018, Hazen, Boone, Ezell, & Jones-Farmer, 2014, Sarkis, Zhu, & Lai, 2011, and Waller & Fawcett, 2013.

4.2 Analysis of the organizational impact of business intelligence and big data according to the organizational theories

As listed in the previous section, 65 studies were conducted to investigate the role of OT in an understanding of BI and BD organizational impact. The next step of this work was to perform in-depth reading and analysis of the papers, discover the common organizational-level BI and BD impact, and group the listed OT accordingly.

This work analysis discovers six common BI and BD organizational impacts: performance, adoption, supply chain support, innovation, decision-making support, and agility. As value creation and competitive advantage are sources for improving organizational performance, they are all grouped under organizational performance.

The following sub-sections provide the results of the literature analysis in order to highlight each of the previous BI and BD impacts, with all the related OTs.

4.2.1 Performance

According to the literature analysis, most of the organizational theories were investigated to explain the effect of BI and BD on business performance (sixteen organizational theories).

Dubey et al. (2018) argue that dynamic capabilities view explains how BI and BD initiatives can be considered as a source of competitive advantage that improves organizational performance. Similarly, Du et al. (2016) argue that evolutionary perspective provides the framework to check how BD can affect organizational performance, and they further argue that knowledge management theory can explain how BD affects service innovation and a firm's performance (Du, Huang, Yeung, & Jian, 2016).

In their interesting study, Erevelles et al. (2016) suggested that an ignorance-based view coupled with inductive reasoning might lead to the discovery of hidden pattern, and future prediction, hence leading to enhance organizational performance.

Knowledge-based view explains how BI and BD can be considered a source of competitive advantage, thus enhances a firm's performance (Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018; Herden, 2020). Furthermore, they observed that organizational information processing view considers BDA as important information processing mechanisms for organizations (Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018). Moreover, they found that resource-based theory explains how BD can promote better performance and innovation (Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018). However, from external perspectives, Bischof et al. (2016) observed that market-based view investigates the strategic relevance of BD, which results competitive advantages gain, hence improved strategic positioning in the market.

Waller & Fawcett (2013) observed that resource dependence theory could explain how BDA may increase a firm's performance. Furthermore, according to service-dominant logic, BD provides enhanced organizational performance by collecting customer data, improving communication with customers, and adapting to environment changes effectively (Xie, Wu, Xiao, & Hu, 2016).

Hazen et al. (2016) argue that social capital theory, in a supply chain context, explains the positive effects of interactions among members on value and norms acceptance, and enhances knowledge sharing, hence improving performance. Furthermore, they argue that systems theory investigates the impact of BD on supply chain performance through the measurement and control of data quality (Hazen, Boone, Ezell, & Jones-Farmer, 2014).

In their study, Akter et al. (2016) argue that sociomaterialism theory presents a balanced view of BDA capabilities by interlinking and enacting management, technology, and people to support a firm's performance. Whereas, Akter & Fosso Wamba (2016) noted that transaction cost economics explains how to use BI and BDA for e-commerce transactions, and enhance organizational performance by improving market transaction cost efficiency, managerial transaction cost efficiency and time cost efficiency.

In their recent research, Wang et al. (2018) observed that practice-based view investigates how to facilitate the implementation of BD to

contribute to business value, hence improving a firm's performance.

4.2.2 Adoption

According to the literature analysis, a good number of organizational theories were applied to foster BI and BD adoption (twelve OT).

Decomposed theory of planned behavior helps to predict the intention to adopt BD (Esteves & Curto, 2013). Similarly, Lee et al. (2016) noted that social comparison theory explains an organization's intention to adopt BD. Fiorini et al. (2018) argue that diffusion of innovation theory helps to understand the process for BI and BD adoption. They further argue that expectancy theory helps to understand how to accept and adopt BI and BD (Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018). Additionally, they argue that goal contagion theory explains the intention to adopt innovative information technology such as BD with limited IT knowledge (Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018). In the same vein, Silva (2015) found that information systems participation theory provides the grounds for successful BD adoption and implementation. In this context, Liu et al. (2015) argue that the technology acceptance model investigates the key factors influencing BD adoption. Hazen et al. (2016) noted that institutional theory explains how external pressures affect the decision to adopt BD for a sustainable supply chain. In the same context, they found that resource dependence theory helps explaining the adoption of BD in supply chain management (Hazen, Skipper, Ezell, & Boone, 2016). In the same vein, Shin (2016) found that normalization process theory helps analyzing how to adopt BD in organizations, and supply chains. Xie et al. (2016) argue that service-dominant logic can explain the effects of adopting BD by co-creating value with customers. Chang et al. (2015) observed that social exchange theory states the behavioral factors that lead managers to adopt BD.

4.2.3 Supply chain

According to the literature analysis, 12 organizational theories were used to examine the effect of BD on the supply chain.

Hazen et al. (2016) argue that actor-network theory can be used to examine the impact of BD on supply chain sustainability, as the theory provides the framework to describe the effect of changing a network (e.g. supply chain) on its actors. Furthermore, they argue that agency theory can be used to analyze BD impact on relationships in a supply chain context (Hazen, Skipper, Ezell, & Boone, 2016). They further argue that ecological modernization describes how BD can support supply chains (Hazen, Skipper, Ezell, & Boone, 2016). Hazen et al. (2016) highlight that institutional theory can explain how external pressures affect the decision to adopt BD for a sustainable supply chain. They further argue that a knowledge-based view highlights the importance of data quality for predictive BDA in supply chain management (Hazen, Skipper, Ezell, & Boone, 2016; Herden, 2020). In the same vein, they argue that resource dependence theory can explain the adoption of BD in supply chain management (Hazen, Skipper, Ezell, & Boone, 2016). Like the previous theories, they tested social capital theory in the supply chain context, and found it can explain the positive effects of interactions among members on value and norms acceptance, and enhance knowledge sharing, hence improving performance (Hazen, Skipper, Ezell, & Boone, 2016). Finally, they investigated systems theory, and argued that it can provide an understanding of the impact of BD on supply chain performance through the measurement and control of data quality (Hazen, Boone, Ezell, & Jones-Farmer, 2014).

Waller & Fawcett (2013) argue that contingency theory can be applied to explain how BD can help a supply chain to adapt to environmental changes. Whereas, Shin (2016) found that normalization process theory can help analyzing how to adopt BD in organizations, and supply chains.

Fiorini et al. (2018) argue that game theory can be used to find the pricing for a green supply chain. They further argue that resource-based theory can explain the impact of BD on supply chains (Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018).

4.2.4 Innovation

Four organizational theories were applied to examine the effect of BD on innovation: absorptive capacity, evolutionary perspective, knowledge management theory, and resource-based theory.

Wang et al. (2018) argue that absorptive capacity can be a source of innovation, as it can be seen as a specific type of dynamic capability. Whereas, Du et al. (2016) argue that evolutionary perspective provides the framework to check how BI and BD can affect service innovation performance. Similarly,

they found that knowledge management theory can explain how BI and BD affects service innovation and a firm's performance (Du, Huang, Yeung, & Jian, 2016).

Fiorini et al. (2018) argue that resource-based theory explains how BD can promote better performance and innovation.

4.2.5 Decision making

Four organizational theories were applied to examine the effect of BD on the decision-making process: game theory, organizational information processing view, stakeholder theory, and transaction cost economics.

According to Liu et al. (2017), game theory can be used to enhance the decision-making process. Hazen et al. (2016) argue that an organizational information processing view can help in assessing the use of BI and BD to reduce uncertainty in the decision-making process. They further argue that transaction cost economics provides the decision makers with the factors for evaluating "make versus buy" decisions concerning BI and BD initiatives (Hazen, Skipper, Ezell, & Boone, 2016).

Wilburn & Wilburn (2016) noted that stakeholder theory can explain how BDA can be used to better satisfy stakeholder expectations, and improve the decision-making process in regards to the organization's stakeholders.

4.2.6 Agility

According to the literature analysis, three organizational theories were used to examine the effect of BD on organizational agility to environment changes. These theories are: contingency theory, dynamic capabilities view, and service-dominant logic.

Waller & Fawcett (2013) argue that contingency theory can be applied to explain how BD can help organizations to adapt to environmental changes. Similarly, Braganza et al. (2017) argue that dynamic capabilities view states that BI and BD can help organizations to adapt to environment changes. Service-dominant logic also explains how BD can support an organization's adaption to environmental changes effectively (Xie, Wu, Xiao, & Hu, 2016).

5. FINDINGS AND DISCUSSION

In the course of this study, we have found and analyzed most of the recent literature on the topic of OT applications on BD. Several findings were made over the course of this research.

According to the literature analysis, both dynamic capability view and resource based theory are the most dominant OTs that have been used to investigate BI and BD issues (about twenty related papers).

Resource based theory was acknowledged as one of the most powerful theories that describes, combines and predicts organizational relationships (Gupta, & George, 2016). Unlike most of the OTs, resource-based theory is the only one that considers origination as a set of dissimilar resources, and by combining them the firm can achieve a competitive advantage (Gupta, & George, 2016). According to Braganza et al. (2017), this theory proposed that resources are tangible resources including data, technology and other basics resources (e.g., time and investment), human resources including managerial and technical skills (Shan, Luo, Zhou, & Wei, 2018), and intangible resources including data-driven culture and the intensity of organizational learning. However, Suoniemi et al. (2017) found that according to the empirical analysis results, BD analytics skills are the most critical domain of BI and BD resources. Hence, they confirm the concerns raised by scholars that a lack of talented people can be the greatest impediment to a BI and BD initiative's success (Nocker & Sena, 2019). Conversely, Braganza et al. (2017) argue that resource-based theory assumptions are not valid for BD and may not be able to explain the management of resources in BD initiatives. Data, the core resource in BI and BD, is not rare. Data may be sourced from many external providers, and can be accessed and used by everyone. The same arguments can be applied for physical resources such as hardware and servers. People with BI and BD skills are hard to find. Often, they are hired from outside the organization, and this may not be employed by the organization and therefor may not be utilized in this theory sense of the word. Braganza et al. (2017) confirm that not all aspects of BI and BD meet the theory requirements.

Dynamic capability view is the organization's ability to update and reconfigure by responding to changes in the external environment to develop sustainable competitive advantages (Erevelles, Fukawa, Swayne 2016). According to Dubey et al. (2018), dynamic capability view was raised due to the resource-based theory failure on providing explanations on the way the resources can

provide competitive advantages to the firm. Dynamic capability view is able to provide the explanation in a changing environment by arguing that the combination, transformation, and renewal of a firm's resources are the base for competitive advantages (Dubey, Gunasekaran, & Childe, 2018). Similarly, Fosso, Wamba et al. (2017) argue that BDA can be considered a dynamic capability that results from the organization's ability to reconfigure resources.

To highlight more findings, Table 1 provides insight into the BI and BD organizational impact with the related OTs.

According to Table 1, organizational performance was the most common BD outcome explained by OTs (fifteen theories). This result agrees with BI and BD literature that considers BI and BD initiatives the source of competitive advantage, which improve organizational performance (e.g. Walls & Barnard, 2020; Lin & Kunnathur, 2019; Nocker & Sena, 2019).

BI and BD adoption was investigated by many OTs (twelve theories; Table 1). Most of the related OTs help to understand how to accept and understand BI and BD adoption (e.g. Ahmad, Ahmad, & Hashim, 2016; Soon, Lee, & Boursier, 2016; Esteves & Curto, 2013; Hazen, Skipper, Ezell, & Boone, 2016).

Interestingly, supply chain sustainability was also highly connected to many OTs (12; Table 1), at the same level as BI and BD adoption. Most of the related OTs are used to examine the impact of BD on supply chain sustainability (e.g. Hazen, Skipper, Ezell, & Boone, 2016; Shin, 2016; Waller & Fawcett, 2013).

Four OTs investigated innovation. These theories explain how BI and BD can promote innovation (Du, Huang, Yeung, & Jian, 2016; Fiorini, Seles, Jabbour, Mariano, Jabbour, 2018; Wang, Kung, & Byrd, 2018).

Four OTs investigated decision-making. These theories explain how BI and BD can be used to enhance the decision-making process (Liu, Shao, Gao, Hu, Li, & Zhou, 2017; Hazen, Skipper, Ezell, & Boone, 2016; Wilburn, & Wilburn, 2016).

Three OTs investigated agility. These theories can be applied to explain how BI and BD can help organizations to adapt to environmental changes (Braganza, Brooks, Nepelski, Ali, & Moro, 2017; Waller & Fawcett, 2013; Xie, Wu, Xiao, & Hu, 2016).

Finally, we should note that some OTs have more than one impact on BI and BD domains

Table 1 Grouping OT according to BI and BD organizational impact.

BI and BD Impact	OT
Performance	Dynamic Capability View
	Evolutionary Perspective
	Ignorance Based View
	Knowledge-Based View
	Knowledge Management Theory
	Organizational Information Processing View
	Resource Dependence Theory
	Resource Based Theory
	Service-Dominant Logic
	Social Capital Theory
	Sociomaterialism Theory
	Systems Theory
	Transaction Cost Economics
	Practice Based View
	Market-Based View
Adoption	Decomposed Theory of Planned Behavior
	Diffusion of Innovation Theory
	Expectancy Theory
	Goal Contagion Theory
	Information Systems Participation Theory
	Institutional Theory
	Normalization Process Theory
	Resource Dependence Theory
	Service-Dominant Logic
	Social Comparison Theory
	Social Exchange Theory
	Technology Acceptance Model
Supply Chain	Actor-Network Theory
	Agency Theory
	Contengency Theory
	Ecological Modernization
	Game Theory
	Institutional Theory
	Knowledge-Based View
	Normalization Process Theory
	Resource Dependence Theory
	Resource Based Theory
	Social Capital Theory
	Systems Theory
Innovation	Absorptive Capability Theory
	Evolutionary Perspective
	Knowledge Management Theory
	Resource Based Theory
Decision Making	Game Theory
	Organizational Information Processing View
	Stakeholder Theory
	Transaction Cost Economics
Agility	Contengency Theory
	Dynamic Capability View
	Service-Dominant Logic

(Table 1). For example, contingency theory impacts the supply chain and agility, game theory impacts the supply chain and decision-making, evolutionary perspective impacts innovation and performance, resource-based

theory impacts the supply chain, innovation and performance, and dynamic capability view impacts performance and agility.

6. CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

This work was conducted to identity the organizational impact of BI and BD based on OTs. Recently, researchers argue that adopting BI and BD solutions enhances organizational performance and the decision-making process. The purpose of this work was to examine all other organizational impact when adopting BI and BD solutions. This goal was achieved by conducting a semi-systematic literature review to find all studies that relate OTs with BI and BD. Then, an analysis was done to understand the use of the OT in accordance with BI and BD. Finally, a grouping was conducted to assign each OT with its BI and BD related impacts.

This work concludes, from the extensive review carried out, that OT supports studies on BI and BD. The study demonstrates that even with the considerable number of OTs that impact BI and BD, they all share the same main characteristics in the BI and BD context: they help understanding BI and BD impact on organizational performance, adoption, support supply chain sustainability and management, innovation, decision-making support, and agility.

This study demonstrates an uneven distribution of OTs use with BI and BD. Although two dominant theories were investigated, resource-based theory and dynamic capability view, there is a need for more research on other important modern theories such as game theory, sociomaterialism theory, goal contagion theory, information systems participation theory, normalization process theory, and service-dominant logic.

This study highlights that OTs have different impact attentions on BI and BD. Organizational performance, BI and BD adoption and supply chain sustainability have the highest attention. The work suggests the need for future studies to focus more on other important directions including innovation, decision-making, and agility.

In term of implication, this work aims to list all up-to-date theories that have been used to support the use and development of BI and BD. Although most of the literature focuses more on the linkage between BD and OTs, BD and BDA can still be seen as a part of BI (Sun, Zou, & Strang, 2015). Hence, the results can be applied for BI accordingly. Exploring how the knowledge of BI and BD has used OTs helps to create innovative insights for theoretically original research in BI, BD and BDA and their impact on a firm's performance, innovation, adoption, agility, decision-making, and supply-chain support.

In term of limitations, this work has some limitations regarding its scope. The articles analyzed were mainly carried out from recent empirical studies including Fiorini et al (2018), and Hazen et al. (2016), and the recent researches in the field, which does not gather all the latest research in the field.

To conclude, we have outlined some avenues for future research in the area of BI and BD. We propose some opportunities for future studies in this promising research area. Future studies could focus on organizational behavior and structure in accordance with BI and BD implementation. Technological research of BI and BD dominates organizational culture studies, especially data-driven, organizational learning and knowledge sharing within BI and BD domains. Future studies could focus on BI and BD organizational culture.

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Journal of Intelligence Studies in Business
Vol. 10, No. 3 (2020) pp. 38-62
Open Access: Freely available at: https://ojs.hh.se/

The linkage between competitive intelligence and competitive advantage in emerging market business: A case in the commercial vehicle industry

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Received 8 September 2020 Accepted 26 October 2020

ABSTRACT To achieve competitive advantage (CA) in emerging markets (EM) firms are suggested to increase market orientation, using competitive intelligence (CI) as a source to increase firm performance. However, in-depth linkage between CA and CI, as well as its awareness/culture and process/structure constructs, has been researched and understood only in a limited way in general and for EM business in particular. This paper gives in-depth clarification of six research questions relating to the connection between CI, its constructs and CA for EM business as well as how CI as a product/process could be adapted for a larger impact on CA. It reports on a qualitative, document and interview data based in-depth single case study at a CI department of a European Union (EU) commercial vehicle manufacturer engaging in EM business. It finds that overall the linkage of CI for CA was traceable and transparent to users/generators of CI in the specific case with ambiguously perceived limitations, and influenced by seven identified factors. Seven out of eight pre-identified CI constructs were promoted but also heterogeneously understood as contributing to CA, with no other relevant constructs identifiable. Adaptions for more impact on CA were recommended for CI as a product in a limited sense, and as a process with eight potential levers more comprehensively. These results help businesses to improve CI, its constructs, its products and process for a better linkage to CA and firm performance.

KEYWORDS Competitive advantage, competitive intelligence, firm performance

1. INTRODUCTION

Emerging markets (EM) became highly attractive target markets in the last two decades (London and Hart, 2004; GoldmanSachs, 2007, 2011; International Monetary Fund, 2011) as part of firm growth strategies to expand to new markets (Ansoff, 1965). They are characterized as turbulent, high velocity, unstable, unpredictable and high rivalry environments, quickly changing in opportunities and threats (Pillania, 2009; Chen, Riitta, McDonald & Eisenhardt, 2010). This requires firms' to respond by adjusting management activities (Fahy, 2002) to not lose their competitive advantage (CA) (Cuervo-Cazurra, Maloney & Manrakhan, 2007). That is why "today's business environment demands a comprehensive system for managing risks in the external business environment" (Calof & Wright, 2008, p.3) for rapid competitive and strategic maneuvering (Thomas & D'Aveni, 2009). Hence, "with high market turbulence and high competitive intensity it is crucial to continually gather and utilize market information to adapt adequately. Under these conditions, a market orientation is assumed to

represent a superior market learning capability, giving a competitive advantage" (Ottesen & Gronhaug, 2004, p.956). Moreover, academic writing proposes that competitive intelligence (CI) can deliver required knowledge of the external environment (Kohli & Jaworski 1990; Trim, 2004; Dishman & Calof, 2008; Fleisher, Wright & Allard, 2008; Prior, 2009; Wright 2013) for firm competitiveness (Maune, 2014). Nevertheless, the linkage between CI and CA has been researched in only a limited way in general (Miles & Darroch, 2006; Seyyed Amiri, Shirkavand, Chalak & Rezaeei, 2017) and for EM business in particular (Adidam, Banerjee & Shukla, 2012). In the quest for superior firm performance in EM business, in-depth understanding of that linkage is considered critical (Kumar, Jones, Venkatesan & Leone, 2011). This study aims for in-depth understanding of the linkage between CI, its constructs and CA with regard to its perceived potential and transparency amongst CI generators and users. Furthermore, it clarifies how CI as a process and a product can be managed and/or modified for CA in EM business.

2. LITERATURE REVIEW AND KNOWLEDGE GAP

The literature proposes a connection between the concepts of CA and environmental based knowledge (Day & Wensley, 1988; Civi, 2000; Hult, Ketchen & Slater, 2005; Ketchen, Hult & Slater, 2007; Voola & O'Cass, 2008). Enhancing that conceptual idea, an empirically supported (April & Bessa, 2006; Badr, Madden & Wright, 2006; Kumar et al., 2011; Adidam, Banerjee & Shukla, 2012; Seyyed Amiri et al. 2017), but not undisputed (Connor, 2007; Ketchen, Hult & Slater, 2007; Qiu, 2008; Kraaijenbrink, Spender & Groen, 2010) linkage between firm performance, CA and the concept of CI was found in existing research (Figure 1).

However, the concept of CI itself was heterogeneously defined (Wright & Calof, 2006; Bisson, 2014; Grezes, 2015) and described with varying terminology (Table 1), causing difficulties identifying a comprehensive body of academic knowledge.

Nevertheless, conceptual frameworks for the complex (Dishman & Calof, 2008; Saayman et al., 2008, Nasri, 2012) connection between CI, its constructs, CA and firm performance (Nadkarni & Barr, 2008; Qiu, 2008; Nasri, 2012) were identifiable in the literature. Based on two suggested overarching viewpoints of CI (Seyyed Amiri et al., 2017)—process and structure (Gayoso & Husar, 2008; Saayman et al, 2008) as well as organizational CI awareness and culture (Nasri, 2012; Asghari, Targholi, Kazemi, Shahriyari & Rajabion, 2020)—it was advocated for potential links to CA contributing and non-contributing CI constructs (Lewis, 2006; Maune, 2014). Eight CI constructs were identified from the reviewed literature as being potentially relevant to CA: 1. Intelligence timing (April & Bessa, 2006; Nadkarni & Barr, 2008), 2. Intelligence type (Momeni & Mehrafzoon, 2013; Bisson, 2014), 3. Organisational intelligence activity integration (Adidam, Banerjee & Shukla, 2012; Fatti & du Toit, 2012), 4. The communication channel through which intelligence is filtered through the organization (Rothberg & Erickson, 2012; Barnea, 2014), 5. Structured, purposeful collection of intelligence (Adidam, Banerjee & Shukla, 2012; Rothberg & Erickson, 2012), 6. Capability of the organization to convert information into action (Kamya et al., 2010; Adidam, Banerjee & Shukla, 2012), 7. Organizational resource allocation to intelligence activities (Salvador and Reyes, 2011; Ngo & O'Cass, 2012), and 8. Organizational attitude to environmental change pressures (Momeni & Mehrafzoon, 2013; Barnea, 2014).

Despite of these findings, "the means by which individual firms gain a competitive advantage and enhance corporate performance in a global environment remain poorly understood" (Fahy, 2002, p.58). This "… lack of empirical evidence" on how "knowledge [is empirically linked] to exceptional performance" or "how knowledge-based advantage is sustained" was also identified by McEvily & Chakravarthy (2002, p.285). Peteraf & Bergen (2003, p.1037) claimed that few "resource-based theorists have paid explicit attention to the conditions necessary and sufficient for competitive advantage of the temporary kind" in the context of CI activities. Only "more recently, strategists and strategy academics have focused their attention on CI as a means for further engendering sustained competitive advantage for businesses" (April & Bessa, 2006, p.86). Ichijo & Kohlbacher (2008, p.181) motivated other scholars to "conduct further… studies… of other global players in order to analyze the process of… knowledge creation in different environments and under different conditions". Further in-depth

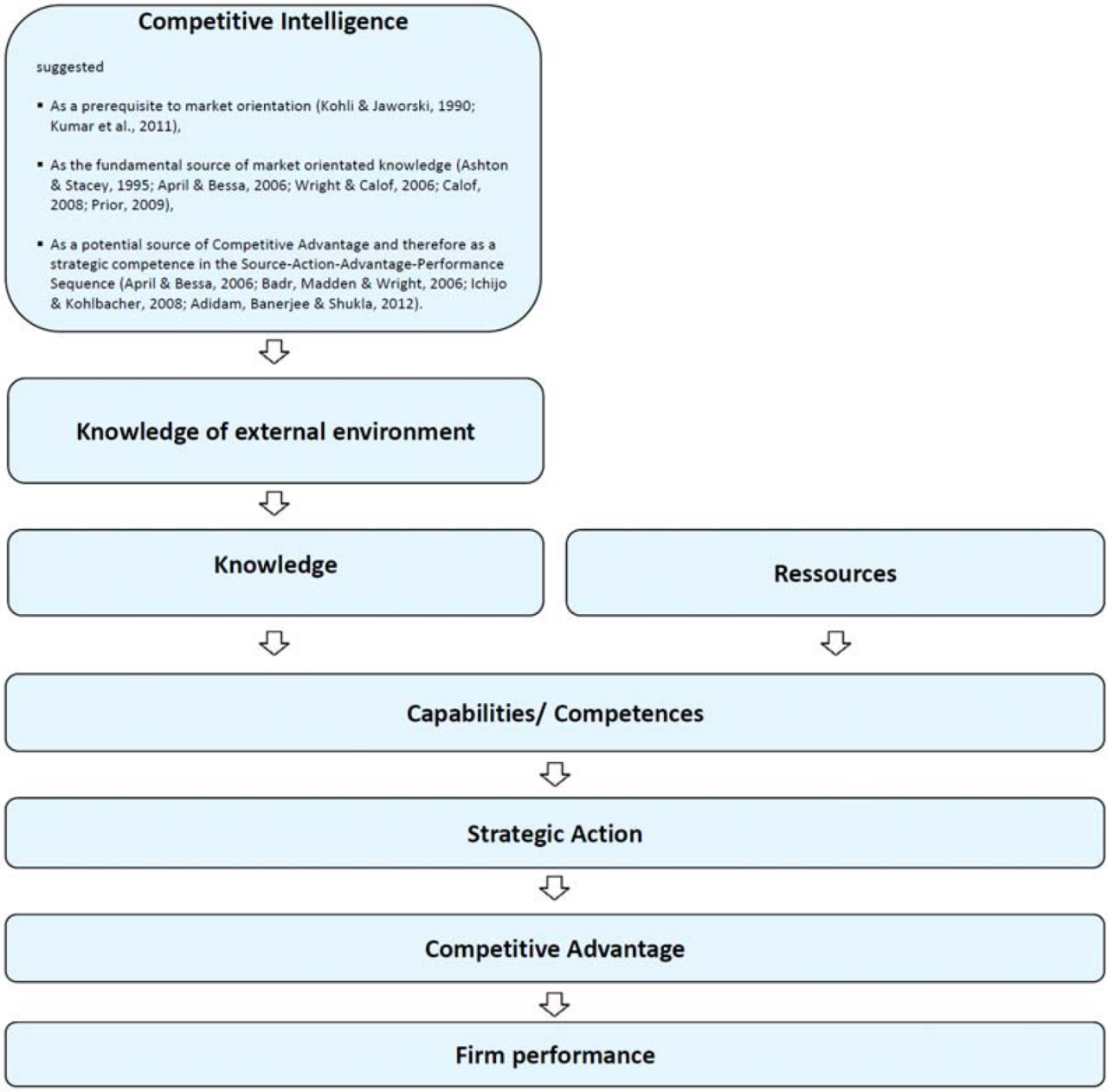

Figure 1 CI connection to competitive advantage and firm performance.

investigations for lacking empirical insights on the if-and-how to create and sustain CA by CI in different industry, firm or country settings were suggested to be required (Kumar et al., 2011, p.16): "Few studies have investigated the longer-term benefits of market orientation" beside the intensive academic quest for in-depth understanding of superior firm performance in global business environments. Hence, "there is little empirical work linking the impact of a firm's CI activities on a firm's performance" (Adidam, Banerjee & Shukla, 2012, p.242-243) and despite that, "there is much empirical research on planning and performance in general, but no major research on CI and performance" (Jenster & Solberg Søilen, 2013, p.16). Also "formalising… the constructs of competitive intelligence" lacked sufficient prior research (Saayman et al., 2008, p. 383). All in all, the linkage of CA relevant CI constructs was indicated by academics as still being under-researched with regard to a systematic investigation approach. Combined research in CI constructs that could potentially contribute to CA was rarely conducted or analyzed in-depth. Moreover, little research was identifiable on CA relevant CI constructs for EM business (Ezenwa, Stella & Agu, 2018), despite its growing importance (Global Intelligence Alliance, 2011). This was surprising, since in "increasingly discontinuous environmental change" (Civi, 2000, p.169) CA was frequently linked to the exploitation of market orientated knowledge strategies, making use of external environment insight generation, with internal

dissemination and responsiveness to these insights (Civi, 2000; Durand, 2003; Peteraf & Bergen, 2003; Ketchen, Hult & Slater, 2007). Additionally, "64% of global companies intend to increase their investments in competitive intelligence or market intelligence over 2012-2013, with a geographical focus on emerging markets in Asia and Latin America" (Global Intelligence Alliance, 2011, p.1). In that context Peyrot, Childs, van Doren & Allen (2002, p.749) claimed, that "the greater the perceived competitiveness of an organization's environment, the higher the level of competitive intelligence use". Despite some academic coverage on EM (Poblano Ojinaga, 2018; Oubrich, Hakmaouia, Bierwolf & Haddanic, 2018; Nte, Omede, Enokie & Bienose, 2020) and related in-depth understanding of CI, CI constructs and CA linkage was perceived as scarce.

Table 1 Overview of identified terminology on intelligence.

Terminology		**Source**
Business	**Intelligence**	Ettorre (1995), Wright & Calof (2006), Nikolaos & Evangelia (2012), Köseoglu, Ross & Okumus (2016), McGonagle (2016), Saddhono, Chin, Tchuykova, Qadri, & Wekke (2019).
Competitive		April & Bessa (2006), Wright & Calof (2006), Brody & Wright (2008), Nadkarni & Barr (2008), Saayman, Pienaar, Pelsmacker, Viviers, Cuyvers, Muller & Jegers (2008), Prior (2009), Adidam, Banerjee & Shukla (2012), Jenster & Solberg Søilen (2013), Momeni & Mehrafzoon (2013), Barnea (2014), Bisson (2014), Calof (2014), Maune (2014), Calof, Mirabeau & Richards (2015), McGonagle (2016), Solberg Soilen (2017).
Competitor		Wright, Pickton & Callow (2002), Chakraborti & Dey (2016), Lee & Lee (2017), El-Muhtaseb (2018), Köseoglu, Mehraliyev, Altin & Okumus (2020).
Competitive Technical		April & Bessa (2006), Calof & Smith (2010), Salvador & Reyes (2011), Salvador & Banuelos (2012), Cerny (2016), Zhang, Robinson, Porter, Zhu, Zhang & Lu (2016).
Strategic		Lasserre (1993), Trim (2004), Pirttimäki (2007), Alnoukari, Razouk & Hanano (2016), Arcosa (2016), Walsh (2017), Levine, Bernard & Nagel (2017), Ben-Haim, (2018), Ahmadi, Baei, Hosseini-Amiri, Moarefi, Suifan & Sweis (2020).
Market		Wee & Ahmed (1999), Pirttimäki (2007), Nikolaos & Evangelia (2012), Rakthina, Calantone & FengWang (2016), Soilen (2017), Falahata, Ramayah, Soto-Acosta & Lee (2020).
Market	**Surveillance**	Nadkarni & Barr (2008), Colakoglu (2011).
Strategic	**Analysis**	Lessard (2003), Papulovaa, Gazovaa (2016), Seguraab, Moralesab & Somolinosb (2018), Köseoglu, Mehraliyev, Altin & Okumus (2020).
	Foresight	Rohrbeck, Heinrich & Heuer (2007), Mueller (2008), Kuosa (2016), Adegbile, Sarpong & Meissner (2017), Iden, Methlie & Christensen (2017), Stan (2017).
Marketing	**Information**	Wright & Ashill (1996), Fleisher, Wright & Allard (2008), Barakat, Shatnawi & Ismail (2016), Mandal (2018).
	Intelligence	Buechner & Mulvenna (1998), Wee (2001), Glance, Hurst, Nigam, Siegler, Stockton & Tomokiyo (2005), Wright & Calof (2006), Fleisher (2008), Göb (2010), Mandal (2017, 2018).
	Research	Walle (1999), van Birgelen, de Ruyter & Wetzels (2000), Wee (2001), Crowley (2004).
Environmental	**Scanning**	Ghoshal & Kim (1986), Babbar & Rai (1993), Bergeron & Hiller (2002), Calof & Wright (2008), Mueller (2008), Nikolaos & Evangelia (2012), du Toit (2016).
	Analysis	Mueller (2008), Dobson, Starkey & Richard (2004).
	Examination	Miles and Darroch (2006).
	Impact Analysis	Babbar and Rai (1993).
Knowledge	**of markets**	Voola and O'Cass (2008).
	of business environment	Civi (2000).
	Management	Weiss, (2002), Greiner, Bohmann and Krcmar (2007), Nikolaos and Evangelia (2012).
Research and Analysis		Ghoshal and Kim (1986).

Concluding, three clear knowledge gaps emerged from the literature review. The need to better understand the transparency of the potential for CI to create and sustain CA in EM competition from the developed market firm perspective was identified (knowledge gap 1). Furthermore, a need for clarification was noticed on CI pre- or not yet identified constructs as potentially connected to CA (knowledge gap 2). Additionally, potential was seen for new insights on possible impacts on the core view of CI as a process and a product (knowledge gap 3).

3. RESEARCH QUESTIONS

The following research questions emerged from the knowledge gaps identified in the extensive literature review (Appendix 1 shows research question 1 as an example):

- (RQ1a) Can the potential of CI for CA be ascertained in the case setting?
- (RQ1b) How transparent is the potential of CI for CA for generators and users of CI in the case setting?
- (RQ2a) Do the underpinning CI constructs potentially contribute to CA in EM business?
- (RQ2b) Do CI constructs other than the underpinning potentially contribute to CA in EM business?
- (RQ3a) Is an adaptation of CI processes recommended to increase its potential for CA?
- (RQ3b) Is an adaptation of CI products recommended to increase its potential for CA?

4. RESEARCH METHODOLOGY AND DESIGN

4.1 Research approach and inquiry strategy

A pragmatism paradigm informed, qualitative research approach was chosen, as it was successfully used in comparable CI research contexts (April & Bessa, 2006). The author selected a mode of inquiry uniting deductive and inductive elements (Alasuutari, Bickman & Brannen, 2008) for desired insights into the pre-defined concepts, but also emerging ones. Empirical investigations were carried out in a unique and under-researched single case setting. Single-case studies are flexible enough to generate the required in-depth (Yin, 2003; Van Wynsberghe & Khan, 2007), integrated insights into real-life contexts (Dubois & Gadde, 2002; Hancock & Algozzine, 2006) and highly individual experiences (Vissak, 2010) on complex phenomena in business management (Cepeda & Martin, 2005; Ghauri & Firth, 2009) and CI studies (April & Bessa, 2006; Fleisher, Wright & Allard, 2008; Ichijo & Kohlbacher, 2008, Salvador & Reyes, 2011; Salvador & Banuelos, 2012; Calof, Mirabeau & Richards, 2015). For research on CI and firm performance, Adidam, Banerjee & Shukla (2012, p.243) stated that "most literature addressing this issue has been… case-based". Ichijo & Kohlbacher (2008) applied case study inquiry to investigate the automotive industry. Since no generalization but in-depth particularization was the aim of this study a single case was selected.

4.2 Selection of case industry, case firm, unit of analysis

The case industry was purposefully (Flyvbjerg, 2006; Ghauri & Firth, 2009) chosen due to its suitability (Eisenhardt & Graebner, 2007) to meet the research objectives: The EU commercial vehicle industry showed a very high degree of globalization (VDA, 2006), a high importance of emerging markets for the industry (KPMG, 2006), and of CI activities for EM business (Roland Berger Strategy Consultant, 2009b). Hence, one of the top European based original equipment manufacturers in that industry was chosen as the case firm since it evidently matched the criteria of globalization (Datamonitor, 2010), EM engagement (Collins Stewart, 2010), a high level of CI activities (Case firm, 2010b) and granted access for research purposes. A fairly complete capture of intelligence activities for EM business activities was believed to be achievable, with the case firm's competitive intelligence department and its intelligence services being selected as a unit of analysis (Case firm, 2011a). This purposeful selection was expected to allow enriched understanding of the researched phenomena.

4.3 Data collection and analysis

Rigorous procedures for single case studies (Yin, 2003; Brereton, Kitchenham, Budgen & Li, 2008; Creswell, 2009) were applied. That is why empirical data for the six research questions was collected through a two-stage approach similar to Ichijo and Kohlbacher (2008). Extensive analysis of 77 documents

(Stage 1A: external documents; Stage 1B: case firm internal documents) followed by 18 semi-structured interviews with the case firm and industry experts (Stage 2). The research questions RQ1a/b, RQ2a/b and RQ3a/b were broken down in qualitatively formulated, open-ended sub-questions (Appendix 1 showing research question 1 as an example) to prepare and increase knowledge retrieval (Hancock & Alogzzine, 2006). A case study protocol and databases (Beverland & Lindgren, 2010) were established. Then, at the first stage more than 50 external reports, publications, articles and presentations from 27 trustworthy, carefully selected and expert-checked expert organizations as well as 30 case firm internal highly-relevant, member-checked presentations, reports, charts and tables were collected. A thorough content and thematic data analysis and interpretation (Bowen, 2009) was undertaken in a qualitative analysis software (NVIVO®) allowing early conclusions and informing the next data collection stage. To establish a transparent chain of evidence and explanation building, data was labelled in NVIVO® with codes, which were in turn categorized (Table 2), allocated to the research questions and assigned to themes reflecting viewpoint and argumentation patterns. Then patterns in the data were matched, negative, discrepant or rivalling insights were addressed and additional documents were searched for; the rivalling explanations were taken further.

From the six original research questions, the sub-questions and the early insights from stage 1, interview questions (Appendix 1 showing research question 1 as an example) for the semi-structured interview guideline master were prepared for a comparable "thematic approach" in each interview (Qu & Dumay, 2011, p.364) which were piloted with two respondents. The experts were purposefully (Rowley, 2012) screened with 10 established criteria and 6 external experts and 12 internal experts were sampled (Appendix 2) from the total of 30 experts approached. This procedure ensured that the 18 respondents (Appendix 2) promised valuable and fairly exhaustive input from different perspectives and viewpoints. The interviews were compliant with research ethics and data protection acts, lasted 45 to 70 minutes and were carried out in person or via telephone. During the interviews, notes were taken or the interviews were audio-recorded. Each completed interview was transcribed to NVivo®, was run through constant comparison analysis procedures (Leech & Onwuegbuzie, 2007) and industry and firm experts' member checking - allowing incremental improvements in data collection, analysis and interpretation. The iterative analysis covered the transfer of interview data and memos to NVivo®, coding of interview data (with emerging, in vivo and constructed codes from stage 1), building a code structure by member-checked categorization of code, allocation to the six research questions as well as construction of themes. While analyzing interview after interview, the initial code list from stage 1 was extended and enhanced by a hierarchical structure via axial coding. Different themes were interrelated and then also categorized after reflection on the six research questions. Where necessary, respondents were revisited during the analysis and interpretation stage.

Table 2 Extract of code system structure.

Categories	Codes applied	Relevance to research focus
Intelligence role explicitly mentioned	Intelligence term used	RQ 1
	Other terms used	RQ 1
Intelligence role indicated	Market by market understanding advocated	RQ 1a, 1b, 2a, 2b
	Market orientation as key success factor	RQ 1a, 1b, 2a, 2b
	Other (indication of intelligence role)	RQ 1a, 1b, 2a, 2b
Link CI to CA given	Market intelligence as key success factor for CA to CA	RQ 1a
	Intelligence as a strategic advantage	RQ 1a
Intelligence constructs used	Content relevance	RQ 2a, 2b
	Organisational level	RQ 2a, 2b
	Timeliness	RQ 2a, 2b
Intelligence insights reflecting emerging market specifics	Geopolitical specifics	RQ 1a, 1b, 2a, 2b
	Dynamism	RQ 1a, 1b, 2a, 2b
	Speed of change	RQ 1a, 1b, 2a, 2b

As required for single case studies (Baxter & Jack, 2008), existing theory was extensively used for comparison with empirical results. In the analysis stage, the empirical findings on the perception and transparency between CI and CA (RQ1a/b), on the pre-identified or other CI constructs' relationship to CA (RQ2a/b), and on the CI process and product adaption needs for emerging market business (RQ3a/b). Further, other emerging themes on the research focus were constantly and consequently compared to the theoretical frameworks from the literature. They were also matched with already retrieved findings from our own data collection. Moreover, two industry experts reviewed the case draft.

5. STUDY RESULTS

5.1 Potential and transparency of CI as a source for CA

In the examined research setting, potential of CI for CA was traceable (RQ1a). However, classic manufacturing industry competences such as "purchasing" (Kern, 2009), "engineering" (Roland Berger Strategy Consultants, 2009a, 2009b; R 1, 3, 4, 5, 14, 15, 17), "production" (Frost & Sullivan, 2011; R1, 5, 13, 17 B4a), or "sales or after sales activities" (McKinsey & Company, 2009a, 2009b; Roland Berger Strategy Consultants, 2009b) were still perceived as dominant potential sources for achieving "low-cost" (Roland Berger Strategy Consultants, 2009a, p.1) or differentiation advantages (McKinsey & Company, 2009a, 2009b).

Moreover, intelligence as a source required for advantageous positioning in the highly product-driven commercial vehicle industry was transparent to generators and users of CI in general (RQ1b). However, this was taken as partly limited and ambiguously perceived. The diverse understanding was retrieved as a very subjective perception as taken from the interviews of generators and users of CI data and literature (Kumar et al., 2011). In particular, transparency in the relationship between CI and CA was a better identifier in an emerging market setting. For example, the potential of CI was transparent to industry experts expressing in their reports that more market orientation for emerging market business is needed "in order to successfully implement… globalization strategy" (Roland Berger Strategy Consultants, 2009b, p.3) to finally gain a higher competitiveness (Koegel Trailer GmbH & Co.KG, 2008; Roland Berger Strategy Consultants, 2009a, 2009b; PA Consulting, 2010; Frost & Sullivan, 2011; McKinsey & Company, 2011). Additionally, market orientation activities such as to "adapt… along local market expectations and the competitive environment" (PA Consulting, 2010, p.3-4), "assessing the competitive landscape" including "comprehensive market research" (McKinsey & Company, 2011, p.3) or listening to the "voice of customers" (Frost and Sullivan, 2011, page 5) were identifiable as signposts of a given transparency on the CI and CA relationship. Furthermore, statements such as "careful analysis of the markets" and "examine the obvious differences that exist between the triad and emerging markets" also proposed transparency of the potential of intelligence-based advantages to industry experts (Roland Berger Strategy Consultants, 2009b, p.3). This understanding matched with the central stance of market orientation as the "generation, dissemination and responsiveness to intelligence" for advantageous competitive positions (Kyriakopoulos & Moorman, 2004, p.224; Ichijo & Kohlbacher, 2008). Analyzed interview statements such as "for emerging market competition... competitive intelligence will... become a source of competitive advantage" (R10) also stated that "knowledge building and converting it into action" is an essential asset for CA (R16) as perceived from existing research (April & Bessa, 2006; Badr, Madden & Wright, 2006) as well. It was said, that "intelligence in all fields... needs to be generated" (R2), avoiding blind spots for emerging market business. Another expert expressed that "knowledge building and converting it into action" is an essential asset for CA (R16). Experts added that "for emerging market competition of the future, competitive intelligence will most likely become a source of competitive advantage - since for the organization involving so far in low risk export business, missing market insights already used to be a competitive disadvantage in the past" (R10). Others were more reluctant on the potential of CI for CA stating that "competitive intelligence is too frequently only nice to know" (R13) or that the "full potential of BI... is not really used" (R7) or "exploited" (R8), questioning intelligence effectiveness (R6, R12) in an "industry [which] is too much product/ engineering driven".

All in all, even for emerging markets transparency was less clearly identifiable than the proposed significant business challenge of these markets suggested (Peyrot et al., 2002). Concluding from the data, transparency on the CI/CA relationship was determined to be dependent on seven influencing factors: (a) industry or individual predominant mindsets, (b) individual risk awareness on CI target markets' complexity, volatility, and insecurity depending on firm or individual familiarity with intelligence target markets, (c) different purpose and objectives of CI, (d) the process of conducting CI (systematic, timely), (e) delivered or achievable quality of CI, (f) type of intelligence available, and (g) action being derived from CI/conversion capability of the firm.

5.2 Potential contribution of CI constructs to CA

Seven (#1,2,3,4,5,6 and 8) out of the eight pre-identified CI constructs from the literature were suggested as potentially contributing to CA in this study setting (RQ2a). Interestingly, the understanding of the single CI constructs' connection to CA was highly individually and frequently ambiguously retrieved from documents and interview data. Appendix 3 shows key insights found in the data for each construct and the understanding created from these. Due to the heterogeneity and the complexity of market drivers influencing the commercial vehicle industry in the emerging market setting (McKinsey & Company, 2011), as well as above-average product, sales and after sales complexity in the case industry (McKinsey & Company, 2011), intelligence timing (#1) was supported in its influence on CA. However, respondents also opposed that conclusion since "the commercial vehicle industry and commercial engine industry is due to long product cycles not involved in hyper-competition business environment" (R5). In line with Rothberg and Erickson (2013) respondents expressed the type of intelligence (#2) as "highly relevant" (R12) for CA, however also limiting it to "actionable knowledge" only (R17). However, this connection was also partly rejected for the case since "rare knowledge is not existing for this industry" (R10); this supported Greiner, Bohmann & Krcmar (2007, p.3) since "not all knowledge... activities have been shown to positively influence business performance or to result in a competitive advantage". Organizational intelligence activity integration (#3) was perceived as potentially CA-relevant since it was stated that "for CA, involvement [of CI] in the strategy process is very important" (R17), advocating that CI needs to be closely linked to decision making to unfold impact on CA. Moreover, CI was demanded to be centralized since "CA most likely created in central functions which sees the company in its wholeness" (R11). However, the opinions on which organizational level CI unfolds its influence best ranged from all organizational levels to corporate level only. It could be concluded from the analyzed data to aim for well-balanced collection and dissemination between central and de-centralized organizational units to outweigh biases on both sides (R9, 17) or to increase speed and timing (R16). Nevertheless, ambiguous perception of the influence of the organizational level CI construct for CA was also retrieved since it was understood as rather a prerequisite of CA than determining it (R15). In the communication channel through which intelligence is filtered through the organization (#4), internal and external respondents across business functions were almost unanimously convinced that it has an impact on CA creation in EM environments. This supported that "disseminating intelligence across the firm is one of the most critical components of effective competitive intelligence" (Adidam, Banerjee & Shukla, 2012, p.249). Respondents suggested to organize a more effective and efficient channel of collection and dissemination by reduction of process barriers ("the closer the channel to operative decision makers, the better", R7) to connect CI closer to decision making. Reduction of the number of involved stakeholders ("too many stakeholders are linked in the process between intelligence creation and usage, so channels are usually long and insights... get easily lost", R2), real-time insight access ("often access to intelligence is missing", R3), and IT tools (R3, R8) were believed to be supportive. Despite the positive perceptions, it was doubted that an ideal channel could be found at all to establish this construct as relevant for CA (R10). Interesting opinions were retrieved on CA influence of structured, purposeful collection of intelligence (#5) and the capability of the organization to convert information into action (#6). One group of respondents believed that both constructs influence CA relevance of CI (R1, 11, 13, 14, 15, 17). Others preferred the conversion capability since "the ability to convert... to action is key" (R13), "collection is important but the capability... might be an

outstanding asset" (R2) and conversion "plays a more important role than sheer collection and analysis of intelligence" (R3) since "unique knowledge in this industry is rare and success is more depending on how quick the insights can be converted into action by experience and talent" (R9). This was overall in line with Herring (1992, p.57) expressing that "successful strategies are derived from good intelligence" whereas "good intelligence by itself, will not make a great strategy" and Babbar & Rai (1993, p.105) stating that "intelligence is merely a necessary but not a sufficient condition for competitive vitality". Case firm internal as well as external experts supported the positive influence of organizational attitude to environmental change pressures (#8) on CA (R6, 8, 18). Respondents believed, that "continuity and a long-term holistic intelligence scope impact CA relevance" (R6) as an expression of organizational awareness for change in attitude and skills towards a greater outside in perspective is required to harvest the potential of CI best. It was claimed that through all hierarchical levels, from supervisory board, management board to each single member of staff, a change of attitude towards market orientation on the individual level is an essential prerequisite for successful CI exploitation (R8, R16).

Furthermore, to the above constructs, neither the last pre-identified construct, organizational resource allocation to intelligence activities *(#7),* nor any other construct's influence on CA was retrievable (RQ2b) in this study. However, the absence of other proposed constructs led to the conclusions that either no further constructs were of relevance in that case setting or that the respondents experience on the matter of CA relevant constructs did not go beyond the discussed constructs.

5.3 Recommended adaptions of CA as a product and a process for CA

On research question 3a only two major recommendations for EM business modification of CI products were identified (RQ3a). While documents provided no insights at all, it was expressed by a generator of CI, that on CI products for EM "the expectation is extremely high while at the same time uncertainty of the results is extremely high" (R18). CI in EM was said to be expected "to deliver not only decision relevant insights but delivering also the decision itself" (R11) requiring the adaptation of the deliverables of CI wherever possible even more directly for direct decision making. Another pattern was identifiable with adapting the product towards full and more proactive transparency on insight reliability (R4, 5, 8, 14, 15, 17). R5 as a user of CI also experienced the even more evident necessity in insecure and highly volatile business environments to "highlight obviously existing higher uncertainty in results" as also identified in Tao and Prescott (2000), suggesting a quality framework determining timeliness, accuracy and reliability of intelligence for EM CI.

On research question 3b (RQ3b), dealing with CI as a process, more comprehensive recommendations for optimization were retrievable for EM from the literature (Gayoso & Husar, 2008). It identified stages of planning, collecting, analyzing and adapting (Appendix 4). It was perceived that the "core process stays the same but the characteristics are different due to low decision relevant data available, frequently lacking basic and advance knowledge of emerging markets amongst decision makers, a high change and dynamism in these environments resulting in a higher uncertainty for decisions and subsequently an increased entrepreneurial risk" (R9). So need for change in the process was expressed by respondents for single but also across phases (Appendix 4) with (a) balanced intelligence insight generation and usage between central and decentralized firm units (plan phase), (b) fit-to-market qualitative research approaches making use of primary sources (collect phase), (c) proactive use of data triangulation approaches combined with analysis against a validity/uncertainty result scale for transparent communication (analysis phase), (d) presentation of developed vs. emerging market deviations (adapt phase), (e) sharing cross-country or cross-segment insights (adapt phase), (f) higher degree of analyst involvement in decision making (adapt phase), (g) IT tool usage, actionable CI generation (across phase), (h) usage on all relevant organizational levels (across phase) as well as (i) analyst training for extended responsibility and task portfolio (across phase). Appendix 4 interprets modification needs against existing academic perspectives.

6. CONCLUSIONS AND BUSINESS BENEFITS

6.1 Conclusion

This study of a commercial vehicle OEM and its CI activities for EM business illuminated the in-depth understanding of CI and its constructs for CA in a not yet investigated, unique and holistic research single case setting. In the examined research setting, the potential of CI for CA was traceable (RQ1a). Moreover, intelligence as a source required for advantageous positioning in the highly product-driven commercial vehicle industry was transparent to generators and users of CI in general (RQ1b), along with, as from literature expectable (Kumar et al., 2011), diverse and ambiguously perceived limitations and influenced by seven identified factors. For the first time in academia, CI and pre-identified CI constructs were investigated in a systematic and joint research approach in this specific context. Concluding, seven out of the eight pre-identified CI (#1,2,3,4,5,6 and 8) constructs from literature were suggested to be potentially contributing to CA (RQ2a), while beyond that neither the last pre-identified construct, organizational resource allocation to intelligence activities (#7), nor any other construct's influence on CA was retrievable (RQ2b) in this study. Furthermore, two major recommendations for modification of CI products (RQ3a), and eight levers for each in literature (Gayoso & Husar, 2008), identified CI process stages of planning, collecting, analyzing and adapting for CI (RQ3b) that were retrievable for EM.

6.2 Business benefits

Despite acknowledging that no generalization is possible from this single case study, generated insights still enable firms to reflect on how to potentially achieve greater impact of CI on CA for their specific case. Benefits would arise from analyzing and improving firm-specific linkages between CA and CI and its transparencies for generators and users in general. Improving the CI setup specifically for constructs such as CI timing, CI type, organizational intelligence activity integration, communication channel through which intelligence is filtered through the organization, procedures for structured, purposeful collection of intelligence and the capability of the organization to convert information into action. Further, firms could also improve organizational attitudes to environmental change pressures on CA impact. Considering potential adaption possibilities such as the two identified for CI as a product or the eight suggested for CI as a process gives further possibility to influence the potential of CI for CA.

7. LIMITATIONS AND AREAS FOR FUTURE RESEARCH

7.1 Limitations

As with other research, this study also has limitations. These could be based in underlying theory, since the conceptual connection of CI and CA was not undisputed (Qiu, 2008) although it is empirically supported (Adidam, Banerjee & Shukla, 2012). Furthermore, terminological heterogeneity of CI (Bisson, 2014; Grèzes, 2015) could have limited the exhaustive knowledge retrieval from the literature review. Due to the selected cross-sectional, single case study setting, research was consequently limited in regard to theory generation, and verification as well as generalization of other firms or industry settings (Rowley, 2002). Potential limitations of the data collection and analysis could have occurred as well. However, possible biases were reduced through rigorously-applied research procedures for document selection, interviewee sampling as well as strictly applied qualitative analysis.

7.2 Future research

With little "empirical work linking the impact of a firm's CI activities on a firm's performance" (Adidam, Banerjee & Shukla, 2012, p.242-243) in existing research, this study in a very particular case setting provided substantial further—but not an exhaustive—contribution to this knowledge gap. Hence, further in-depth or complementary particularization as demanded by Ichijo & Kohlbacher (2008) for further "formalizing... the constructs of competitive intelligence" (Saayman et al., 2008, p. 383) are obvious areas for future research. This could be done, for example, by researching in-depth in the same case a) in one CI construct only, b) in all constructs but longitudinally; or examining another complementary case c) in the same industries on the same or another value chain/system level or other cultural/national background or d) in a similar/other industry with a longitudinal timeframe. Moreover, future research could try to generalize the retrieved findings for e) one or f) all constructs in a cross-sectional/ longitudinal timeframe in a representative sample.

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APPENDIX

Appendix 1: Interrelating central research problem, research questions, sub-research questions and interview questions shown for research question 1 as an example. Research objectives= Research objectives in the context of emerging market business from a developed market firm perspective this study aimed. In this table, the central research problem is: What potential does competitive intelligence have to create and sustain competitive advantage in emerging market competition by exploiting an adapted process and tailored-to-fit products?

Research objectives and Research question	Sub-questions	Interview questions for the semi-structured interview guideline
To ascertain the potential of CI to create and sustain CA 1a: Can the potential of CI for CA be ascertained?	1a.1) Which sources (resource-/ competence-/capability-/knowledge-based) for firm performance differences / CA in emerging markets are considered? 1a.2) How is CI (or any synonymously/ similar term) linked in this context? 1a.3) If a link is considered: How is it described? 1a.4) If no link is considered: What are reasons for that? 1a.5) If other sources are considered: Which sources are mentioned? 1a.6) If other sources are considered: What are reasons for mentioning them?	B1) What is your understanding of a Competitive Advantage a firm holds? B2a) Which Competitive Advantage do you believe a Commercial vehicle OEM needs to hold in the industry by now? B2b) Which Competitive Advantage do you believe a Commercial vehicle OEM needs to hold in 5 to 10 year? B3a) Which Competitive Advantage do you believe THE CASE FIRM holds by now? B3b) Which Competitive Advantage do you believe THE CASE FIRM needs to hold in 5 to 10 year? B4a) Which sources of CA at THE CASE FIRM do you identify? B4b) [If knowledge/data/information/ intelligence of the external environment is not named]: How about CA by knowledge of external environment? C1a) When coming to emerging market competition: Which Competitive Advantage do you believe a Commercial vehicle OEM needs to hold in the industry by now? C1b) When coming to emerging market competition: Which Competitive Advantage do you believe a Commercial vehicle OEM needs to hold in the industry in 5 to 10 years? C2a) When coming to emerging market competition: Which Competitive Advantage do you believe THE CASE FIRM inhibits by now? C2b) When coming to emerging market competition: Which Competitive Advantage do you believe THE CASE FIRM needs to inhibit in 5 to 10 year? C3a) Which sources of CA for emerging market at THE CASE FIRM do you identify? C3b) [If knowledge/data/information/ intelligence of the external environment is not named]: How about CA by knowledge of external environment? D1) Which Character do BI results have according to your opinion? □ Nice to know □ Important to know □ Decision criticial □ CA relevant insights □ Other
To clarify how transparent the potential link between CI and the creation of CA is for generators and users of CI. 1b: How transparent is the potential of CI for CA for generators and users of CI?	1b.1) Is a link between CI (or any synonymously/ similar term) and firm performance differences/ CA considered?	D2a) Is CI explicitly used to create Competitive Advantage for emerging market competition? Who is aware of link of CI and Competitive Advantage and uses it explicitly? D2b) Does in your opinion the company retrieve and absorb actionable knowledge and transfer it to activities meaning a temporary or sustainable Competitive Advantage for the Emerging Market business of the firm? D2c) If so, which Competitive Advantage for emerging market competition are suggested to be achieved by CI? D2d) How does this link look like for emerging market competition: intelligence as a whole (elements of it) embedded process wise in product development, business/functional strategy development? How is CI embedded? D2e) If the link how Competitive Intelligence as a process and a product can be managed to create and/or sustain Competitive Advantage in emerging market competition is non-existant in the case company: Why is this the case? What needs to be changed to link CI and Competitive Advantage? E1) What is the perception since when the company uses Competitive Intelligence in the case firm? E2) What is the initial trigger/ reason for implementation of Competitive Intelligence in the case firm (initial target, today's target?)? What did change with emerging market competition?

		E3) Where (at which levels, where in the organisation) is Competitive Intelligence created? Is all part of the external strategic analysis explicitly done by Competitive Intelligence department? If not, where else does the information come from-how, by whom and why is it there created? Were any amendments made for emerging market competition? E4) How is the BI department organized in regard of organisational structure, division of labour, mission and vision, aims and objectives, processes, …? Were any amendments made for emerging market competition? E5) How is intelligence in general and for emerging market competition process and process-stage-wise (Plan-, collect- and data source-, analysis- and dissemination-wise) generated? E6) Which kind of information is collected in the BI department in general? What kind of knowledge tries the company to build on emerging market (as the growth promising perspective) in regard of the Macro- and Microenvironment? E7) At what organisational levels, where and by whom is Competitive Intelligence for emerging market competition used? What happens with the generated information and how is it used?

Appendix 2: Biographical interview background data and sampling criteria. CV = commercial vehicles.

Criteria for purposive sampling		**Interviewee number**								
		#1	**#2**	**#3**	**#4**	**#5**	**#6**	**#7**	**#8**	**#9**
Case firm int. expert	**v** (>=10)	x	x	x	x	x	x	x	x	x
Case firm ext. expert	**v** (>=5)									
Industry	**v** (CVI or related to CVI and case firm)	CV	CV	CV	CV	CV	CV	CV	CV	CV
Dept.	-	Business Strategy Dept	Business Strategy Dept	Product Strategy Dept	Product Strategy Dept	Sales Dept	Sales Dept	Project Manage-ment Office	Strategy and Planning Dept	BI Dept
Position	**V** (>=Expert)	Senior consultant new business segments	Senior Consultant Multi Brand Strategy and Globalisation	Head of Business Foresight Commercial vehicles	Senior product strategy developer Global Trucks	Sales Manager External Engines Off highway	Business Developer Emerging Market Projects	Program Manager Light Vehicles	Head of Strategy and Planning Southern Africa	Senior Manager
Professional expertise in industry (in years)	**v** (>=three)	five	six	four	six	five	six	five	ten	five
Work focus on EM in %	**v** (>=50)	70	80	60	70	60	100	60	100	50
Relationship to CI	**v** User (U) / generator (G)	U	U	G and U	G and U	U	U	G and U	G and U	G and U
Anticipated Understanding of CI	**V** CI as process/product to create business environment insights	advanced	advanced	advanced	advanced	adequate	advanced	adequate	adequate	top
Anticipated degree of CI usage	-	high	high	high	high	Low/ medium	high	Low/ medium	medium	high
Anticipated preference on potential sources for firm performance differences	**v** 50:50 share of KBV vs CBV	CBV	CBV	KBV/ CBV	CBV	CBV	(CBV)/ KBV	CBV	(CBV)/ KBV	(CBV)/ KBV

Criteria for purposive sampling		Interviewee number								
		#10	#11	#12	#13	#14	#15	#16	#17	#18
Case firm int. expert	**v** (>=10)	x								
Case firm ext. expert	**v** (>=5)		x	x	x	x	x	x	x	
Industry	**v** (CVI or related to CVI and case firm)	CV	CV	CV	CV (competitor firm 2)	CV (competitor firm 1)	Automotive consultancy	Intelligence Research Service provider 1	Intelligence Research Service provider 2	Intelligence Research Service provider 3
Dept.	-	BI Dept	BI Dept	BI Dept	BI Dept	Business Strategy	Automotive practice	Automotive practice	Automotive practice	Automotive practice
Position	**v** (>=Expert)	Head of market and competitor analysis truck and bus	Head of market research	Analyst for emerging market CIS and India	Market Analyst	Senior Consultant	Manager	Global Director	Managing Partner	Manager
Professional expertise in industry (in years)	**v** (>=three)	five	three	five	nine	three	eight	ten	twelve	ten
Work focus on EM in %	**v** (>=50)	50	60	100	60	60	70	50	60	60
Relationship to CI	**v** User (U) / generator (G)	G and U	G and U	G and U	G and U	G and U	U	G	G	G
Anticipated Understanding of CI	**v** CI as process/ product to create business environment insights	top	top	top	top	top	advanced	top	top	top
Anticipated degree of CI usage	-	high	high	high	high	high	Medium/ high	high	high	high
Anticipated preference on potential sources for firm performance differences	**v** 50:50 share of KBV vs CBV	KBV	KBV	KBV	KBV	CBV	CBV/ (KBV)	(CBV)/ KBV	KBV	KBV

CI constructs	Key Insights from study data	Created Understanding in this study
Intelligence timing	Support for construct: “ *faster and more in time delivery of intelligence would be accounted as helpful*” for CA (R6, 12), “ *continuity and a long-term* [oriented] *intelligence scope*” were also suggest to impact CA (R6). Reluctant support for constructs contribution for CA: Construct might be“ *less important than the other* [constructs]” (R17). Rejection of constructs support for CA “ *really [not] seeing relevance, not even in emerging markets*” (R5) underlining that the “ *the commercial vehicle industry and commercial engine industry is due to long product cycles not involved in hyper-competition business environment*” .	The study supported from the case setting the demand for a frequency and timing of CI which is adapted to the competitiveness of the firm specific environment. Timely strategic responses to changes in the environment to outperform competitors in the quest for CA was confirmable from the selected case. Thus, doubts on whether in turbulent, volatile and high velocity environment speedy responses could build a sustainable CA at all were also understood from the selected case. However, individual perception of environmental and competitive pressure still suggested that increasing speed and frequency of insight availability could support CA creation.
Intelligence type	Support for construct: “ type of intelligence [is] retrieved as highly relevant” (R12), limiting it to “ actionable knowledge” for CA relevance (R17), Reluctant support for constructs contribution for CA: Experts felt unsecure regarding the supporting potential of that very construct in the light of others (R15) Rejection of constructs support for CA: Perception that “ rare knowledge is not exisiting for this industry” (R10)	Actionability respectively usability and relevance of intelligence was understood as potentially CA relevant. Qualitiy, type, accuracy, up-to-dateness, depth and comprehensiveness were in the case setting for emerging market business identified CA and performance relevant properties of the intelligence type. However, the perception in the case on whether intelligence as non-substitutable, rare, valuable and inimitable, complex and firm specific as well as tacit - rarely available and accessible -nowledge as a source of CA is retrievable at all in the commercial vehicle industry, provided a valuable criticism of the supportive position on that construct.
Organisational intelligence activity integration	Support for construct: “ *for CA, involvement* [of CI] *in the strategy process is very important” (R17),* “ *CA most likely created in central functions which sees the company in its wholeness” (R11),* Reluctant support for constructs contribution for CA: Activitiy integration is a relevant matter but rather a prerequisite of CA than determining it (R16) No impact seen since other constructs more clearly determining CA (R7, R10)	It could be shown, that organisational activity integration of CI is also potentially perceived as CA relevant. However, the opinions on which organisational level CI unfolds its influence best ranged from all organisational levels to corporate level only. Furthermore it was demanded that CI needs to be closely linked to decision making to unfold impact on CA. Thus, ambigious positions or clear rejections showed that individual experiences and perspectives on emerging markets vary the perception of a constructs significantly.

CI constructs	Key Insights from study data	Created Understanding in this study
Communication channel through which intelligence is filtered through the organization (intelligence dissemination)	Support for construct: " *Channel most critical"* (R3) but communication must be effective and efficient: and " *the best channel is depending on several variables such as the topic/level of demanded detail, on established formalistic or less formalized processes, on people (and their proactive attitude towards knowledge), on individual competences as well as positions and functions in the organization*" (R9), intelligence " results need direct access to top management without being filtered (R11) Ambigious perception on CA impac t " most effective and efficient channel for each CI task" hard if not unrealistic to be found (R10)	For the *Communication channel through which intelligence is filtered through the organization* construct the data presented a potential impact on CA. This underlined the findings from Adidam, Banerjee and Shukla (2012, p.249) saying that " disseminating intelligence across the firm is one of the most critical components of effective competitive intelligence" – as the study data showed in particular for emerging market business. Organising more effective and efficient channel of intelligence collection and dissemination by reduction of process barriers connecting CI closer to decision making, reduction of number of involved stakeholders, real-time insight access and by IT tools is understood as supportive for CA impact. However, the potential impact on CA was also critised for the challenging quest establishing an ideal channel in complex organisations.
Structured, purposeful collection of intelligence **The capability of the organization to convert information into action**	Both constructs relevant One group of respondents believed that both constructs influence CA relevance of CI (R1, 11, 13, 14, 15, 17) Conversion capability as more relevant construct " *the ability to convert... to action is key*" (R13), " *collection is important but the capability might be an outstanding asset*" (R2) and " *plays a more important role than sheer collection and analysis of intelligence*" (R3) since " *unique knowledge in this industry is rare and success is more depending on how quick the insights can be converted into action by experience and talent*" (R9).	On the *structured, purposeful collection of intelligence* and the *capability of the organization to convert information into action* construct this study contributed diverse knowledge. On one hand both constructs were believed as influencing CA relevance of CI. Also in existing research sourcing of intelligence in emerging market context was identified as a significant challenge for organisations. On the other hand experts considered the capability of the organization to convert information into action as the only relevant Competitive Intelligence construct in regard to CA impact out of the two discussed. In their view intelligence was regarded as a necessary but not sufficient prerequisite for Competitive Advantage. This supported a viewpoint in existing academic research in which " developing a competitive advantage requires appropriate [organizational] capabilities" (Kamya et al., 2010, p.2978; Adidam, Banerjee and Shukla, 2012) and in which the capability of the organization to convert information into action is understood as a key enabler for an advantageous position of firms in their industry.

CI constructs	Key Insights from study data	Created Understanding in this study
Organisational attitude to environmental change pressures	Support for construct: In an emerging market business context " continuity and a long-term holistic intelligence scope impact CA relevance" (R6) Respondents believed furthermore, that in particular in emerging market business organisational awareness for change in attitude towards a greater outside in perspective is required to harvest the potential of CI best (R8). It was claimed that through all hierarchical levels, from supervisory board, management board to each single member of staff a change of attitude towards Market Orientation on individual level is an essential prerequisite for successful CI exploitation (R8, R16).	The *organisational attitude to environmental change pressures* construct was also identifed as potentially CA relevant. Individual Market Orientation attitude was expressed as an essential prerequisite. For emerging market business organisational awareness for change in attitude, culture as well as skills towards a greater outside-in perspective seemed to support the potential of CI.
Others	-	On further constructs potentially impacting CA no additional construct was retrieved. It was only concludable from the retrieved data that CI constructs most likely cannot be applied solely to unfold impact towards CA. It is suggestable that CI constructs should be joined and integrated in a holistic Competitive Intelligence approach to unfold significant impact on CA.

Appendix 4: CI process phase modification needs for EM business.

Single CI Cycle Phase	Single phase modifcation needs identified from findings	Finding critically assessed against existing academic perspectives	Interpretation and Conclusion from the researcher	Across phase modifcation needs identified from findings	Finding critically assessed against existing academic	Interpretation and Conclusion from the researcher
Plan Phase	Balanced intelligence insight generation and usage between central and decentral firm units	Dispersed distribution planning (Rothberg and Erickson, 2012): Decentral intelligence to be well linked to firms' regional/ central headquarter (Lasserre, 1993; Du Toit and Muller, 2004; Ichijo and Kohlbacher, 2008; Hoppe, 2013).	To overcome the challenge of lacking market insights knowledge creation and sharing practises between central and decentral units are required to be established, however organisational structures are frequently a barrier for an open and timel exchange.			
Collect phase	Fit-to-market qualitative research approaches	Rather qualitative than quantitative approaches to emerging markets proposed as success factor (Tao and Prescott, 2000).	Qualitative research approaches in emerging markets rather seem to bridge cultural inacceptance of quantitave survey designs in (for example in Arabian countries or in markets were the number of experts is not large enough representing a population suited for survey design).	**Optimize channelling of generation, dissemination and responsiveness by an IT tool**	IT supported CI tool for the full intelligence cycle allows more effective and efficient processing but more importantly accessing the intelligence generated (Barnea (2014).	Effective and efficient dissemination of intelligence via an IT Tool can foster its usage increasing also intelligence credibility when access to raw data/analys is made possible.
	Fit-to-market primary source bases	Rather primary source (personal contact) based (Tao and Prescott, 2000; Adidam, Banerjee and Shukla, 2012) than secondary data based research approaches (Lasserre, 1993; Wee and Zafar, 1999) suitable for EM.	Missing or lacking reliability of statistics in emerging markets seem to be a reason to rely rather on direct contact to market experts (customers, association members, analysts,...) => really allow understanding the markets.	**Generate and use CI at all relevant central and local organisational levels**	" Internal procedures guaranteeing the two- sided flow of information from external and internal sources and making intelligence available to those who need it to accomplish their assignments" act as a key success factor for CI (Barnea, 2014, p.105)	In noted turbulent and volatile emerging markets a holistic CI generation and dissemination approach seems to deliver the most promising results, however questioning business efficiency.

Single CI Cycle Phase	**Single phase modifcation needs identified from findings**	**Finding critically assessed against existing academic perspectives**	**Interpretation and Conclusion from the researcher**	**Across phase modifcation needs identified from findings**	**Finding critically assessed against existing**	**Interpretation and Conclusion from the researcher**
Analysis phase	Proactive use of data triangulation approaches	Triangulation of different sources to increase reliability and insight depth (Tao and Prescott, 2000).	Different sources in emerging markets are suggested to be required to overcome lacking completeness, accuracy and reliability of secondary data; however taking also in consideration that opinions of	**Prepare analysts for the specialisation degree and an extensions of the analysts task, product and**	--	Specialisation of analysts along emerging market relevant criteria (countries, segments,...) can potentially increase intelligence effectiveness and efficiency by overcoming complexity,
	Analyze against a validity/ uncertainty result scale for transparent communication	" TAR" framework suggested: Timeliness, Accuracy and Reliability of intelligence (Tao and Prescott, 2000, p.74).	Intelligence users which are mainly experienced in developed market intelligence might be over-confident when accessing intelligence results of emerging markets without a proactive stated reliability judgement.	**Optimize actionability of CI activities**	The organisational conversion capability at the end of intelligence cycle suggested as key to	Actionability of intelligence as result of analysis is perceieved as vital for CA which is a cross phase procedure of the CI cycle.
Adapt phase	Presentation of developed vs. emerging market deviations	--	Demanded for cross-emerging/ developed or cross-segment market comparison point to the need for to developed markets contextualised support for understanding However, it is questionable whether this contrasting presentation style is a long-term solution in a globalised world. Increasing emerging market			
	Sharing of cross-country or cross-segment insights	--				
	Higher degree of analyst involvement in decision making	Organisational activitiy integration of CI in decision making (Tao and Prescott, 2000; Du Toit and Müller, 2004; Ichijo and Kohlbacher, 2008).	Integratiing CI analysts in decision making sounds promising to increase informed decisions, however it binds additional capacities and demands for different capabilities.			

Journal of Intelligence Studies in Business
Vol. 10, No. 3 (2020) pp. 63-79
Open Access: Freely available at: https://ojs.hh.se/

The impact of perceived accounting benefits on the enterprise resource planning success: The mediating role of effective system use

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Received 13 August 2020 Accepted 26 October 2020

ABSTRACT In the past decades, enterprise resource planning (ERP) systems have become increasingly automated, particularly for routine management accounting tasks. However, there has been little research investigating the accounting benefits of adopting ERP systems. This study investigates the role of perceived accounting benefits in ERP success. Drawing on Juran's principle of 'fitness for use,' this study establishes a framework that captures how perceived accounting benefits influence effective system use, which, in turn, enhances enterprise success. Using Partial Least Squares – Structural Equation Modelling (PLS-SEM) with survey data collected from 120 enterprises in Vietnam that have implemented ERP, our findings provide strong support for the predicted positive effect of perceived accounting benefits on enterprise success, and for the hypothesis that this relationship is fully mediated by effective system use. This study is novel for two reasons. First, it is one of the first attempts to provide empirical evidence that effective system use and enterprise success are valuable outcomes of accounting benefits perceived to be gained from the use of ERP systems. Second, it discovers and demonstrates that effective system use is the most appropriate system-use concept in the present enterprise systems-related context, a topic that remains under discussion in the literature.

KEYWORDS Effective system use, enterprise resource planning, enterprise success, fitness for use, perceived accounting benefits

1. INTRODUCTION

An enterprise resource planning (ERP) system refers to commercial software that automates and integrates many or most of a firm's business processes. This type of system allows access to integrated data across the entire enterprise in real-time (Davenport, 1998). Thus, an ERP system is expected to increase firm productivity via processes standardisation, improve decision-making ability via information integration throughout the entire enterprise, enhance cooperation between organisational entities by connecting them smoothly, and, most importantly, maintain competitive advantage once these benefits are realised (Davenport, 1998). These expected benefits serve to explain the increasing popularity of firm adoption of ERP systems. For example, Fortune 500 companies trust ERP systems, and in relation to the present study, large-sized organisations in Vietnam have been increasingly adopting ERP systems.

However, some firms have faced difficulties achieving the benefits they expected from adopting an ERP system. Therefore, as

suggested by Markus and Tanis (2000), it is of great interest to researchers and managers to discover whether investing in an ERP system will pay off. Several organisational-level econometric studies have found that, on average, investment in ERP systems does indeed create benefits (Anderson, Banker, & Ravindran, 2003; Hitt, Wu, & Zhou, 2002). However, such benefits vary among enterprises, and even among accounting modules (Nicolaou, 2004). Kanellou and Spathis (2013) review the literature related to the benefits of implementing ERP systems and conclude that ERP implementation has a considerable effect on the accounting departments of firms. Thus, managers must ask the following questions: What are the accounting-related benefits perceived from implementing an ERP system? Is it possible that these benefits can support organisations to implement ERP systems effectively? How do perceived ERP accounting benefits affect the success of the ERP system itself?

It is important to address these questions. Kanellou and Spathis (2013) provide the only study to investigate these questions. However, their study has several limitations. First, the outcome of perceived accounting benefits is conceptualised as user satisfaction, which is not an appropriate measure of ERP system success. To address this issue, this study adopts effective use and ERP success to measure the success of ERP systems. Second, while Kanellou and Spathis's (2013) analysis unit is the firm, their study is conducted at the operational level (the informants are accountants) rather than at the organisational level (in which case the informants would typically be managers such as accounting professionals working as chief accountants or controllers). To address this limitation, this study is conducted at the organisational level. Measuring the success of ERP systems at the organisational level allows for information to be aggregated at higher levels, enabling success to be evaluated at the industry, regional, national and global level. Therefore, the present study is expected to provide greater insight into the role of perceived accounting benefits in the success of ERP systems.

As stated, the present study aims to examine the effect of the perceived accounting benefits gained by the effective adoption of ERP on system success. The study draws on Juran's principle of fitness for use to establish a framework for the effect of perceived accounting benefits on effective system use, and how this effect enhances enterprise success. The findings of this study will be of value to any companies considering including their accounting techniques and operations in an ERP system. Further, the results of this study will provide guidance and motivation for organisations that have implemented ERP systems but are in trouble.

The remainder of this paper is organised as follows. Section 2 begins with a review of the previous research, and then presents the research model and hypotheses. Section 3 justifies and describes the methodology employed for the study. Section 4 reports and analyses the results of the study. Section 5 concludes by presenting the theoretical and practical implications of the study, the study limitations, and suggestions for future research.

2. LITERATURE REVIEW, RESEARCH MODEL AND HYPOTHESES

2.1 Perceived accounting benefits (PAB) from the ERP system and PAB outcomes

Several studies have investigated the technical, managerial and economic advantages of ERP implementation. For example, Rouhani and Mehri (2016) show that ERP implementation benefits (e.g., decisional empowerment, improved interaction with customers, improved decision-making process, increased flexibility in information generation, and improved information flow among departments) have a positive impact on the level of readiness in business intelligence readiness. If ERP is integrated with business intelligence, it can provide additional value to organisations (Søilen & Hasslinger, 2012). Under a business intelligence platform, data collected by ERP can be stored in a data warehouse and then further analysed and exploited for problem-solving and value enhancements (Langlois & Chauvel, 2017). However, the evaluation of the accounting benefits generated by an ERP system remains inadequate and unsystematic. This section reviews studies that focus on the interaction between accounting and ERP systems to gain an understanding of the perceived accounting benefits derived from ERP.

Spathis and Constantinides (2004) find the following three most important motives leading business organisations to decide to adopt an ERP system rather than retain their traditional information system: increased

demand for real-time information, information generation for decision making, and need to integrate applications throughout the entire enterprise. These authors also explore several positive changes related to accounting applications arising from ERP implementation, such as flexibility in information generation, increased integration of accounting applications, improved quality of reports and statements of accounts, improved decisions based on timely and reliable accounting information, and reduction of time for closure of annual accounts.

Some studies have provided an in-depth analysis of the accounting benefits arising from improving the quality of an ERP system's output. For example, Velcu (2007) and Colmenares (2009) identify that ERP implementation allows reports and statements of accounts to be provided more accurately. Brazel and Dang (2008) state that ERP appearance reduces reporting lags. Olhager and Selldin (2003) explain that ERP implementation also increases the availability of information, the integration of business procedures and functions, and the quality of information.

Spathis (2006) and Colmenares (2009) find that an additional accounting benefit perceived to be gained from the use of ERP systems is connected to decision-making ability. Specifically, it was found that ERP supports enhancements to the decision-making process in a business organisation (Spathis, 2006) and ERP implementation is usually followed by improvements to the decision-making process and enterprise integration (Colmenares, 2009).

In addition, Gattiker and Goodhue (2004) and Chang (2006) find that other accounting benefits arising from ERP implementation are eliminating chores associated with report writing and data entry. Gattiker and Goodhue (2004) find specifically that an ERP system results in an increase in coordination within the enterprise, and Chang (2006) finds that an ERP system connects traditional business functions such as finance, production, warehousing and sales into a single integrated system based on a shared database.

Other studies have noted how the accounting process and the accountant's role are affected by the implementation of an ERP system. For example, Booth, Matolcsy, and Wieder (2000) examine the extent to which the application of an ERP system can lead to the adoption of new accounting practices. Booth et al. (2000) demonstrate that the entire ERP system constitutes sources of data for new accounting practices, and thus can support these practices powerfully. More specifically, Rom and Rohde (2006) find that an ERP system not only provides considerable assistance in the collection of data but also increases the organisational breadth of management accounting. This finding is confirmed by Järvenpää (2007), who notes that an ERP system leads to new management accounting being adopted. Thus, accountants obtain several advantages from ERP implementation because they are able to conduct routine activities more effectively, handle large databases more quickly, and report in a faster and more flexible manner.

Several studies have found that the accountant's role considerably changes when the ERP system is implemented. Granlund and Malmi (2002) find that the most important benefit of ERP implementation in relation to accounting is the improvements made in the mass processing of documents. This improvement in efficiency allows management accountants to spend more time focusing on analysis and business support processes rather than on designing and generating appropriate reports. These findings are consistent with Scapens and Jazayeri (2003), who find that the implementation of ERP systems has shifted the work of management accountants from a traditional role focused on accounting activities to a more interpretative role focused on analysis, information evaluation and decision making. To reflect this shift, accountants are considered 'consultants' and 'analysts' rather than 'bookkeepers.'

Hyvönen, Järvinen, and Pellinen (2008) present the development of a management accounting control system, and suggest that information technology (IT) accounting solutions in general compel accountants not only to examine the logic of the solution but also to invent ways of combining accounting and management rationalities. Similarly, Newman and Westrup (2005) employ case studies and a survey to demonstrate empirically that the relationship between accountants and technologies (e.g., ERPs) has become increasingly intertwined. Indeed, Newman and Westrup (2005) argue that the development of ERP results in reshaping the management accountant's role, and that this redefinition of the management accountant's role then has a positive effect on ERP. More recently, Grabski, Leech, and Schmidt (2011) also acknowledged the change in the role of

management accountants during the process in which firms learn how to use ERP systems and obtain considerable value from these systems (Grabski et al., 2011). It is clear that ERP systems affect accounting processes and the role of accountants.

O'Leary (2004) analyses and measures 'ERP system benefits' and tests whether these benefits vary across different industries, and then classifies a list of these benefits into tangible and intangible. Some benefits relate to accounting functions such as inventory reduction, close financial cycle reduction, personnel reduction, management improvements, IT cost reduction, on-time delivery, information/visibility, integration, flexibility, better decisions, financial controls and new reports/reporting capability.

In an attempt to conceptualise and operationalise 'ERP benefits', Shang and Seddon (2002) proposed a comprehensive framework for assessing the benefits derived from ERP systems. Their framework groups ERP benefits according to five dimensions: operation, management, strategy, IT infrastructure and organisation. Similarly, but more narrowly, Esteves and Dwivedi (2009) develop a benefits-realisation road map for ERP usage focusing only on small and medium-sized enterprises. The analyses show that the dimensions of ERP benefits realisation are interconnected, and that managers should perceive this connection as a continuum cycle during the ERP post-implementation period to maximise ERP benefits. The accounting benefits gained through ERP use identified by Esteves and Dwivedi (2009) that are quite similar to those of Shang and Seddon (2002) are cycle time reduction, cost reduction, quality improvement, improved decision making, support of organisational changes, increase in IT infrastructure capability and increase in business flexibility.

More relevant to the present study, Spathis (2006), Spathis and Ananiadis (2005) and Kanellou and Spathis (2011) focus on developing a measurement of ERP accounting benefits. The analyses of Spathis (2006) are based on Shang and Seddon's (2002) ERP benefits classification. Thus, Spathis's (2006) perceived accounting benefits from ERP are classified into organisational benefits, operational benefits, managerial benefits and IT benefits. Spathis (2006) hypothesises that perceived accounting benefits can be explained by the following variables: the number of reasons for enterprise resource implementation, the number of enterprise resource modules, enterprise resource cost as a percentage of sales and the company's total assets. According to Spathis's (2006) survey findings, the most important accounting benefits in the ERP environment are increased flexibility in information generation, increased integration of applications, improved quality of reports and statements of accounts, improved decisions based on timely and reliable accounting information and reduction of time for closure of annual accounts. These results are consistent with those of Spathis and Ananiadis (2005) and Kanellou and Spathis (2011).

The literature confirms the benefits of ERP through the examination of the effect of ERP systems on an organisation's financial performance. However, the present study is most interested in the direct effect of ERP systems on the accounting process, a topic that remains to be explicitly examined.

Most of the research noted above explains only what accounting-related benefits are or how accountants are affected in an ERP environment. Only four articles have investigated and developed a scale of the accounting benefits attained from ERP systems (i.e., Kanellou and Spathis (2013), Spathis (2006), Spathis and Ananiadis (2005), Spathis and Constantinides (2004)). As presented in Table 1, only the scale of Kanellou and Spathis (2013) is adequately validated by testing the relationship between perceived accounting benefits and user satisfaction. However, user satisfaction is only a part of system success, not a scale for measuring system success because a user being satisfied with an ERP system does not ensure that the ERP system leads to enterprise success.

2.2 System use

In the original DeLone and McLean information systems (D&M IS) success model, systems use is referred to as the 'recipient consumption of the output of an information system' (DeLone & McLean, 1992, p. 66). However, an information system is constantly changing. Enterprise systems adopted in business organisations nowadays are more mandatory than voluntary, thus, conceptualisation of the original system use in the D&M IS success model seems likely to be inappropriate.

In an excellent literature review, DeLone and McLean (2016) detail the development of information systems literature focusing on

systems use. However, they focus only on the context of adoption. Deng, Doll, and Truong (2004) list three available system contexts: training, adoption (sometimes understood as technology acceptance) and ongoing, which are often referred to as the 'pre-implementation', 'implementation' and 'post-implementation' stages, respectively (Chang, Gable, Smythe, & Timbrell, 2000). DeLone and McLean (2016) do not consider systems use in the training and ongoing contexts at all despite training being 'one of the most important activities of the pre-implementation stage of any information system' (Deng et al., 2004) and, more importantly, ongoing referring to the duration of the success of the ERP system, which is partly captured by the use construct (DeLone & McLean, 1992, 2016) and occurs to a great extent (Sternad, Gradisar, & Bobek, 2011). Previous research on the ERP lifecycle phases (Chang et al., 2000; Markus & Tanis, 2000; Ross & Vitale, 2000) finds that training belongs to the ERP pre-implementation stage—which includes the ERP design, chartering and project stages—and ongoing belongs to the ERP post-implementation stage—which includes the ERP stabilisation, continuous improvement and transformation stages, or the ERP onward and upward stage, as in Chang et al. (2000), Ross and Vitale (2000), and Markus and Tanis (2000), respectively.

Based on a highly insightful statement by Deng et al. (2004) about the differences between the training and ongoing use contexts, DeLone and McLean's (2016) comprehensive review of system use, and the literature review presented here, this study summarises and analyses the differences in system use in different use contexts, which correspond to the pre-implementation, implementation and post-implementation stages. It must be remembered that systems used in the training, adoption and ongoing contexts are similar in relation to the aspect that IT usage always faces possible challenges in relation to technique, technology and human factors. Nevertheless, the three contexts differ in their goals, time horizons, knowledge domains, identification of solutions to problems, practice environments, requirements for user behaviours, nature of appropriate support, and characteristics of related information systems. These differences reflect the dynamic and complex nature of system use and become a prerequisite for selecting an appropriate conceptualisation of 'system' that can be used in the present study's focus on the ERP post-implementation stage.

The context is often implicit rather than explicit, which means that using an inappropriate system-use construct is likely to affect research findings. Therefore, we claim that the meaningful conceptualisation and operationalisation of system use must consider the characteristics of the information system (mandatory or voluntary), the users employing the information system, the task performed with the information system, and most importantly, the system context in which the information system occurs (i.e. training, adoption or ongoing). The present study also emphasises that once the ongoing use is formed, it can be acceptable to employ it as the system used in the adoption context because there are no great differences in the use characteristics of the adoption and ongoing contexts. The limitation of this approach is that users' perceptions of ongoing use in the adoption context are perhaps different from what they are in the ongoing context because it takes time for a user to be familiar with a new system.

Given these criteria for selecting a meaningful and appropriate system-use construct, this study chose effective system use (Doll & Torkzadeh, 1998) to represent ERP adoption and ongoing use. When users become more sophisticated, they may be expected to accomplish their tasks more efficiently and effectively. Thus, following Doll and Torkzadeh (1998) and Deng et al. (2004), in the present study, the concept of 'use' refers to how effectively an ERP system is used for fundamental organisational functions such as problem solving, decision making, work integration, and work planning.

2.3 ERP system success

There are limited studies that have concentrated on measuring the success of an ERP system (Mukti & Rawani, 2016). Therefore, on the grounds that an ERP system is a type of information system, the present study reviews all popular measurements of the success of information systems and ERP systems in the literature.

A review of the success of information systems shows there are many definitions of success as it relates to information systems. Thus, there is no formal definition of the phenomenon of information systems success. Each kind of stakeholder has a different definition of the success of an information

system in an organisation (Grover, Seung Ryul, & Segars, 1996; Ifinedo, 2011). For example, from the perspective of the system developer, the information system's success is achieved when the information systems project is completed on time, under budget, and functions correctly. For customers or users, an information system is successful if it improves user performance and satisfaction (Guimaraes & Igbaria, 1997). From the organisational perspective, an information system's success is measured by its contribution to the company's profits or competitive advantage. In addition, the success of an information system also depends on the type of system to be evaluated (Seddon, Staples, Patnayakuni, & Bowtell, 1999).

Despite the value of these definitions of the success of an information system, this study focuses on DeLone and McLean's (1992) conceptualisation of measuring information systems success because this conceptualisation provides a schema for categorising the measures of information systems success (Ifinedo, 2011) and their framework has been widely used to assess the effectiveness or success of information systems at the organisational level (Petter, DeLone, & McLean, 2008). Accordingly, effectiveness constitutes the 'extent to which an information system actually contributes to achieving organisational goals' (Thong & Yap, 1996, p. 252). Therefore, this study defines ERP success as referring to whether the adoption of an ERP system has improved effectiveness in the implemented enterprises. Notably, by this definition, ERP success does not refer to success in relation to ERP technical installation or ERP technical implementation, which are measured by factors such as cost overruns, project management metrics and time estimates (Hong & Kim, 2002; Markus & Tanis, 2000).

2.4 Research model and hypotheses

Under a completely different approach, the framework of the present research is developed based on the principle of fitness for use concerning product and service quality, as defined by Juran (1988). We argue that a prerequisite for using an ERP system effectively is the quality of the ERP system. There are two reasons for this. First, the quality of an ERP system determines how the system can be used. Second, if the quality of the ERP system is reduced, there will be a low level of success in most cases (Kronbichler, Ostermann, & Staudinger, 2010). Thus, the successful adoption of an ERP system must consider the quality of the ERP system. This is why the principle of fitness for use is applied in this study. In information systems literature, this principle is commonly adopted to examine data and data quality (Laudon, 1986; Redman, 1995; Strong, Lee, & Wang, 1997; Vermeer, 2000; Wang & Strong, 1996). Similarly, the present study adopts this principle to clarify the system and system-related qualities.

The enterprise system (i.e., ERP system) and other goods have distinct differences. First, an enterprise system is created through acquiring or self-designing, while organisations can produce products or services by themselves. Second, a product or service can be exhausted through use, but an enterprise system is not depleted through use. That is, the elements of an ERP system can be exploited simultaneously by multiple users and continue to be available for employment in a different context by subsequent users. These characteristics of an ERP system are significant when considering the principle of fitness for use.

The principle of fitness for use involves developing a shortlist of inputs that companies, organisations, and individuals can use to determine the fitness for the use of a product or service. Juran and Godfrey (1999) and Juran (1988) provide the following questions for consideration:

- Who are the users of the product or service? (Who)
- What are the economic resources of both the producer and the user? (What)
- How will the product or service be used? (How)
- What are the users' specific determinants of a product or service's fitness for use? (Economic benefits)
- What is the possibility and/or probability of the product or service endangering humans? (Privacy and security)

The present study does not consider the safety aspect of adopting an ERP system, thus it applies four of the above five queries to explain the appearances of, and connections among, all the constructs including PAB, system use and ERP success in the proposed framework. Accordingly, this study defines who, what, how and the economic benefits of and ERP system as follows:

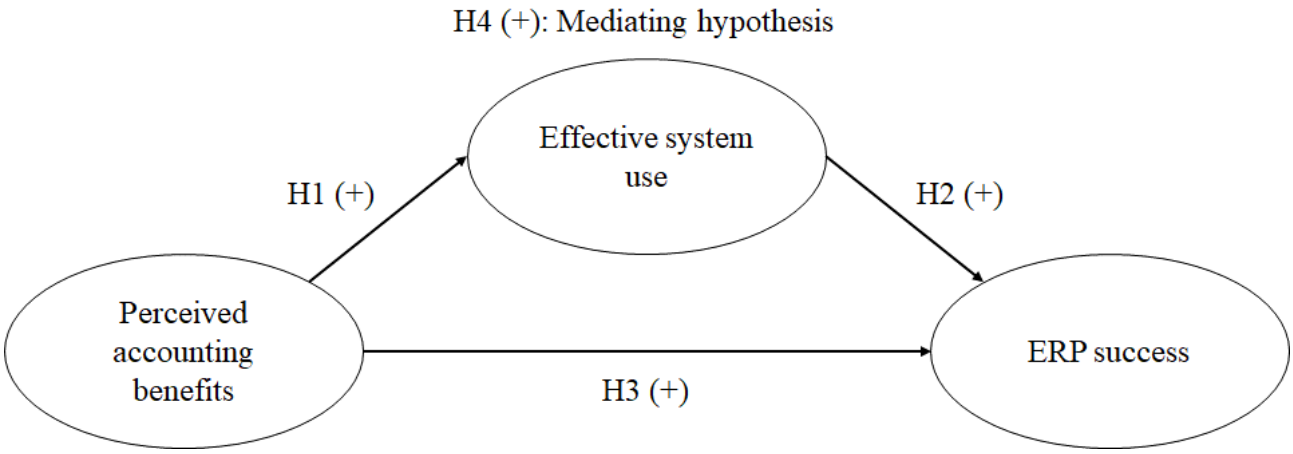

Figure 1 Research model and hypothesis.

- Who = the accounting professionals in this study; these professionals are expected to be the most knowledgeable and effective users of the ERP system
- What = the perceived accounting benefits are the economic resources of both the producer and the user of the enterprise system
- How = effective use, which refers to how the system is used
- Economic benefits = the ERP system's success is a specific determinant of the system's fitness for use.

Following the principle of fitness for use (Juran and Godfrey (1999), this study assumes that based on the perceived accounting benefit ('what'), accounting professionals ('who') will effectively exploit an ERP system ('how') to achieve the system effectiveness ('economic benefits') that accounting experts expect when using an ERP system. Accordingly, perceived accounting benefits are the antecedents of ERP system use and ERP system success is the outcome of ERP system use. Hence, the hypotheses are proposed:

H1. Perceived accounting benefits have a positive influence on use.

H2. Use has a positive influence on ERP system success.

H3. Perceived accounting benefits have a positive influence on ERP system success.

H4. Effective system use mediates the relationship between perceived accounting benefits and ERP system success.

The research model and corresponding hypothesis are shown in Figure 1.

3. RESEARCH METHOD

3.1 Sampling and data collection

This present study was conducted in Vietnam, and features a data set of 120 firms. The sample is restricted to organisations that have adopted an ERP system for at least one year because the research focuses on the implementation and post-implementation stages. The core aim of this study is to investigate perceived accounting benefits, thus the respondents are experienced accounting employees. However, this study is conducted at the organisational level, which means that each respondent represents one company.

Therefore, the most suitable informants are chief financial officers and chief accountants. Unfortunately, given that there are few enterprises in Vietnam that have implemented ERP (a very low percentage of the total enterprises operating in Vietnam), accessing potential respondents is extremely difficult. Thus, the study identifies acceptable alternatives such as internal controllers, internal auditors and management accountants who have accounting experience related to ERP and a general understanding of the operations of the entire enterprise. In addition, according to Shang and Seddon (2002), it takes two to three years for users to become familiar with a new enterprise system and extract the maximum benefits from that system. Thus, the informants in this study are chief financial officers, chief accountants, internal controllers, internal auditors, and management accountants who have worked in organisations that have been using an ERP system for at least one year and have at least two years of work experience in their current position.

The sampling frame includes 5,110 email addresses of the potential informants (who

have all the above characteristics) from the personal LinkedIn social network of the authors of this study. The original survey items in English were translated into Vietnamese and back-translated following Brislin's (1970) translation process. The official Vietnamese version of the survey questionnaire was circulated to potential informants via SurveyMonkey, an online survey administration tool.

We emailed the 5,110 potential respondents (with several follow-up emails) over two-and-a-half months, and received a total of 569 responses. After eliminating 177 organisations that had not adopted an ERP system, 78 responses from respondents whose employment position did not meet the inclusion criteria, 50 responses from respondents who did not have sufficient work experience, 102 incomplete responses, 26 responses whose response duration was too short (less than 10 minutes), and 16 outliers, the final sample consists of 120 valid responses. The profile of the responding organisations is presented in Table 1.

The details of ERP systems adopted in organisations in Vietnam are summarised in Table 5. The sample enterprises utilise different ERP packages (most use either SAP or Oracle). All sample enterprises had ERP software installed and implemented for at least one year.

Table 1 Demographic characteristics of surveyed companies.

	Frequency	%
Type of ownership		
100% foreign-owned enterprises	23	19.2
State-owned enterprises (≥51% government capital)	22	18.3
Private enterprises/limited enterprises	54	45
Joint venture with foreign partners	14	11.7
Joint venture with domestic partners	7	5.8
Total	120	100.0
Type of industry sector		
Manufacturing	72	60.0
Commercial	44	36.7
Services	42	35.0
Total	120	100.0
Type of industry		
Bank, insurance, investment	2	1.7
Chemical and pharmaceuticals	3	2.5
Dairy, food and meat products	28	23.3
Electrical and electronics	7	5.8
Medical and healthcare	8	6.8
Information technology	10	8.3
Manufacturing	12	10.0
Retail/wholesale/distribution	25	20.8
Telecommunications	3	2.5
Transportation, logistics and courier	7	5.8
Construction	6	5.0
Others (e.g., beverages, fashion, design, fast-moving consumer goods)	9	7.5
Total	120	100.0
Company size (paid-in capital) in VND billion		
<10	3	2.5
10–50	6	5.0
>50–100	11	9.2
>100–200	12	10.0
>200–500	14	11.7
>500–1000	22	18.3
>1000	52	43.3
Total	120	100.0
Company size (number of employees)		
≤50	8	6.7
51–200	13	10.8
201–500	29	24.2
501–1000	23	19.2
1001–5000	32	26.7
5001–10000	9	7.5
>10000	6	5.0
Total	120	100.0

Table 2 Demographic characteristics of the ERP system.

	Frequency	%
Type of ERP software		
Oracle	20	16.7
SAP	43	35.8
XMAN (ERP)	2	1.7
SalesUp ERP	2	1.7
Navision	3	2.5
Microsoft Dynamic	4	3.3
Lemon	3	2.5
FAST (ERP)	3	2.5
Others (e.g., AMIS–MISA, Bamboo, Bravo, Bross, Maconomy, MMIS, Peoplesoft, PERP)	40	33.3
Total	120	100.0
Years ERP has been implemented and used in the current company		
<1 year	0	0.0
1–2 years	21	17.5
>2–4 years	16	13.3
>4–6 years	37	30.8
>6–8 years	13	10.8
>8 years	33	27.5
Total	120	100.0

The demographic characteristics of the informants are shown in Table 3. Most informants have a bachelor's degree, 52.5% are female and 47.5% male. Most are aged between 25 and 34 years. They have an average of 6.5 years of work experience, and an average of approximately 2.7 years of experience using the ERP system in their current position. Moreover, the informants report using the ERP system frequently (5.4 of a 7-point Likert scale).

3.2 Measurement scales

All research constructs included in this study have multi-item scales derived from the relevant literature. Each item in the survey employs a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). All instruments have been tested and defined in related research (Deng et al., 2004; Gable et al., 2003; Kanellou & Spathis, 2013) as reflective-reflective constructs. Perceived accounting benefits (PAB as a construct) are measured using the scales from Kanellou and Spathis (2013). This construct includes five dimensions: IT accounting benefit (5 items); operational accounting benefit—time (4 items); organisational accounting benefit (5 items); managerial accounting benefit (3 items); operational accounting benefit-cost (1 item). The scale for effective system use includes 11 items from Deng et al. (2004), which were adapted from Doll and Torkzadeh (1998). In Deng et al. (2004), these 11 items are partially aggregated into four unlabelled congeneric indicators. ERP system success, according to Sedera and Gable (2004), is a second-order construct measured by four first-order components: information quality (5 items), system quality (8 items), individual impacts (4 items), and organisational impacts (8 items). It is tested and defined as a reflective-reflective construct (Sedera & Gable, 2004).

To ensure the content validity of the measurement scales in the research context of Vietnam, before collecting data, we conduct a preliminary measurement assessment through an expert panel composed of three academics who are knowledgeable about ERP and two managers: one internal controller and one expert that has experience in successfully implementing numerous ERP projects in large enterprises. The preliminary measurement assessment confirms the high consensus of the expert panel on the ability of the selected scales to measure the research concepts in the model. Next, the questionnaire is piloted with three accounting experts in enterprises that have adopted an ERP system, after which some minor adjustments are made to the survey to ensure the questions are worded clearly and concisely, and are easy for the informants to understand.

To ensure that the structure of the scale sets is consistent with the surveyed data collected in Vietnam, this study conducts exploratory factor analysis (EFA) to determine the appropriate structure of the variables without reducing the number of items employed to capture the concepts under investigation. In

doing so, this study employs principal axis factoring with Promax rotation and a minimum eigenvalue of 1 (Hendrickson & White, 1964) for data analysis. The exploratory factor analysis results determine that of the three scales, the ERP success construct is immediately acceptable, while the others need to be refined. PAB is a second-order construct with two factors extracted from 13 items (the remaining items are eliminated). Effective system use is also a second-order construct with two factors extracted from eight items (the remaining items are eliminated).

4. DATA ANALYSIS, RESULTS AND DISCUSSIONS

All instruments in this research model are second-order constructs. Partial least squares (PLS) allows the conceptualisation of higher-order factors through the repeated use of manifest variables (Tenenhaus, Amato, & Esposito Vinzi, 2004). A higher-order factor can thus be created by specifying a latent variable, which represents all the manifest variables of the underlying lower-order factors. The study uses the PLS approach because of the limited

Table 3 Demographic characteristics of informants.

	Frequency	%	Min	Max	Mean
Position in the firm (job title)					
Chief finance officer	15	12.5			
Chief accountant	39	32.5			
Internal controller	45	37.5			
Internal auditor	15	12.5			
Management accountant	6	5.0			
Total	120	100.0			
Position in the organisation's hierarchy					
Top management position	27	22.5			
Mid-level personnel	51	42.5			
Senior staff	39	32.5			
Staff	3	2.5			
Total	120	100.0			
Gender					
Female	63	52.5			
Male	57	47.5			
Total	120	100.0			
Education background					
College degree	0	0.0			
University (bachelor's) degree	101	84.2			
University (master's) degree	19	15.8			
Total	120	100.0			
Age					
<25	3	2.5			
25–34	66	55.0			
35–44	51	42.5			
>44	0	00.0			
Total	120	100.0			
Experience					
Years in the current position			1	20	6.5
Years using ERP at the current position			1	5	2.7
The extent of ERP system use (i.e., the degree to which informants agree with the following statements according to a 7-point Likert scale ranging from 1 "strongly disagree" to 7 "strongly agree")					
'We use the ERP system for many hours per day at work.'			1	7	5.2
'We use the ERP system for many times per day at work.'			1	7	5.5
'Overall, we use ERP a lot.'			1	7	5.4
Intention to continue the use of ERP system (i.e., the degree to which informants agree with the following statements according to a 7-Likert scale ranging from 1 strongly disagree to 7 strongly agree)					
'We intend to continue using the ERP in our job.'			3	7	6.2
'We intend to use more functions of the ERP.'			3	7	6.1
'We intend to continue using the ERP to process more tasks'			2	7	6.2
'We intend to suggest that our company should continue to use the current ERP system.'			1	7	5.9

Table 4 Internal consistency, indicator reliability and convergent validity analyses of the first-order measurement model.

First-order factor	Indicator	Loading[a]	Composite reliability[b]	AVE[c]
PAB_oganizational	PAB11	0.84	0.94	0.65
	PAB12	0.89		
	PAB13	0.87		
	PAB14	0.78		
	PAB15	0.83		
	PAB16	0.80		
	PAB17	0.76		
	PAB18	0.64		
PAB_operational	PAB6	0.95	0.95	0.86
	PAB7	0.96		
	PAB8	0.95		
	PAB9	0.93		
	PAB10	0.86		
USE_work	USE5	0.91	0.93	0.77
	USE6	0.81		
	USE8	0.92		
USE_decision	USE11	0.87	0.90	0.69
	USE1	0.79		
	USE3	0.85		
	USE4	0.88		
	USE7	0.81		
IQ	IQ1	0.75	0.93	0.68
	IQ2	0.79		
	IQ3	0.86		
	IQ4	0.90		
	IQ5	0.81		
	IQ6	0.84		
SQ	SQ5	0.77	0.89	0.56
	SQ6	0.79		
	SQ8	0.70		
	SQ2	0.71		
	SQ1	0.76		
	SQ7	0.77		
AP	AP1	0.90	0.94	0.80
	AP2	0.89		
	AP3	0.92		
	AP4	0.87		
OP	OP1	0.78	0.94	0.64
	OP2	0.85		
	OP3	0.80		
	OP4	0.75		
	OP5	0.81		
	OP6	0.81		
	OP7	0.82		
	OP8	0.78		

valid sample size and the desire to analyse the second-order constructs. Data are analysed in two stages through PLS using Smart PLS software (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014).

4.1 Assessment of the measurement model

Measurement instruments are assessed based on reliability, convergent validity and discriminant validity. Construct reliability measures the stability and consistency of the scale, and is evaluated through internal consistency reliability and indicator reliability (Hair et al., 2014). Composite reliability measures the internal consistency reliability of the scale. Tables 7 and 8 demonstrate that all the reflective first-order factors and second-order factors have composite reliability that is over the cut-off value of 0.7, as suggested by Hair et al. (2014). However, some of the factors have quite a high value; for example, PAB_operational (0.95), PAB (0.96) and ERP success (0.95). These figures are considered sufficiently close to 0.95 (Hair et al., 2014). Hence, they are possibly acceptable.

Indicator reliability is assessed through outer loadings. Table 4 demonstrates that the

outer loadings of all but one (i.e., except item PAB18) of the observed first-order factors of all constructs range between 0.70 and 0.96, which is higher than the cut-off value of 0.70 (Hair et al., 2014). The loading of indicator PAB18 falls only slightly below 0.70 (0.64). We decide to retain this indicator for two reasons. First, we attempt to delete PAB18, and then re-estimate the internal consistency and convergent validity of the first-order factor 'PAB_operational'. The results show that deleting PAB18 leads only to an extremely slight increase in composite reliability and average variance extracted. Second, and more importantly, PAB18 expresses the item 'The ERP enables a reduction in the number of personnel in the accounting department', which is indispensable because it explains the benefit of operational cost reduction that an organisation experiences when adopting an ERP system. This item has also been used in different scales measuring perceived accounting benefits in previous studies (Kanellou & Spathis, 2013; Shang & Seddon, 2002; Spathis & Ananiadis, 2005).

Almost all of the average variance extracted values of all the first-order factors and second-order factors are acceptable because they are higher than 0.50 (Fornell & Larcker, 1981). Only ERP success (0.44) (see Table 5) was less than 0.50. ERP success is a second-order factor, and its composite reliability is higher than 0.60. Therefore, its convergent validity is adequate (Fornell & Larcker, 1981). In addition, the variance inflation factor values for each relationship between variables in the proposed model range between 1.00 and 1.81, which is well below the cut-off value of 5.0 (Hair et al., 2014), indicating no issues of multicollinearity in this study.

We evaluate the discriminant validity of the measurements following the procedure proposed by Fornell and Larcker (1981). Table 6 demonstrates that the square roots of average variance extracted of all first-order factors range between 0.75 and 0.93, which is well above the corresponding correlations between these variables, thus indicating the discriminant validity of the measurements.

4.2 Assessment of the structural model

To test the proposed model and hypotheses, we evaluate the strength and significance of individual paths concerning the predictive relevance of these individual paths in the proposed model. The indices employed to evaluate the predictive relevance of individual paths are reported in Table 7. These indices are calculated based on 5,000 bootstrapping samplings.

The results of testing the direct relationships are presented in Table 7. Our hypotheses offer adequate explanatory power because the R^2 values for all the predicted variables, effective system use (0.45) and ERP success (0.67), are far greater than the recommended level of 0.10. Specifically, this study finds positive direct effects of PAB on USE ($\beta > 0.67$, $p < 0.001$), of USE on ERP success ($\beta > 0.14$, $p < 0.05$) and of PAB on ERP success ($\beta > 0.72$, $p < 0.001$). Thus, H1, H2 and H3 are strongly supported.

Table 5 Internal consistency and convergent validity of the second-order measurement model.

Second-order factor	First-order factor	Composite reliability[b]	AVE[a]
PAB	PAB_ogranizational PAB_operational	0.96	0.63
USE	USE_work USE_decision	0.92	0.60
ERP success	IQ, SQ, AP, OP	0.95	0.44

Table 6 Discriminant validity (Fornell–Lacker criterion). Note: The diagonal shows the square root of the average variance extracted of the latent variables and indicates the highest in any column and row

	AP	IQ	OP	PAB_ operational	PAB_ organizational	SQ	USE_decision	USE_work
AP	0.89							
IQ	0.49	0.83						
OP	0.63	0.48	0.80					
PAB_operational	0.54	0.63	0.47	0.93				
PAB_organizational	0.61	0.69	0.67	0.73	0.80			
SQ	0.45	0.76	0.46	0.60	0.66	0.75		
USE_decision	0.56	0.52	0.49	0.53	0.70	0.45	0.83	
USE_work	0.47	0.39	0.39	0.42	0.56	0.40	0.64	0.88

Table 7 Direct relationships for hypotheses testing (using PLS bootstrapping).

H	Relationship	Std beta	Std error	*t*-value	Hypothesis testing result	95% CI LL	95% CI UL
H1	PAB -> USE	0.67	0.06	11.51***	Accepted	0.57	0.76
H2	USE -> ERP success	0.14	0.07	1.94*	Accepted	0.03	0.25
H3	PAB -> ERP success	0.72	0.07	11.05***	Accepted	0.61	0.82

Notes: ***$p < 0.001$, $p < 0.05$; R^2 (USE = 0.447, ERP success = 0.673)

Table 8 Results of direct, indirect and total effects (using consistent PLS bootstrapping).

H	Relationship	Std beta	Std error	[t-value]^	Hypothesis testing result	95% CI LL	95% CI UL
H3	PAB -> ERP success	0.72	0.07	11.05***	Accepted	0.61	0.82
H4	PAB -> USE -> ERP success	0.08	0.01	1.22	Accepted	−0.02	0.18
	Total	0.85	0.04	21.69***		0.78	0.91

Notes: ***$p < 0.001$, *$p < 0.05$; R^2 (USE = 0.447, ERP success = 0.673)

In addition, this study utilises a procedure for mediation analysis using partial least squares – structural equation modelling (PLS-SEM) as proposed by Nitzl (2016) to test further the mediating role of USE on the relationship between PAB and ERP success. Accordingly, consistent PLS bootstrapping is employed to calculate the related indices. Table 8 affirms that USE fully mediates the relationship between PAB and ERP success. Thus, H4 is supported.

5. CONCLUSION

5.1 Theoretical implications

Based on the significance of the statistical tests in the previous section, the proposed model and all of its hypotheses were accepted. These results have some important theoretical implications. First, based on previous studies relating to the accounting benefits perceived to be gained from the use of ERP systems (Kanellou & Spathis, 2013; Spathis, 2006; Spathis & Ananiadis, 2005; Spathis & Constantinides, 2004), this study discovers new outcomes of perceived accounting benefits. That is, the study provides further empirical evidence of the effects of perceived accounting benefits on ERP use as well as on ERP success. Second, the findings from this study provide evidence to support Juran's principle of fitness for use by examining the critical role of accounting experts in enhancing ERP success. Accordingly, based on the perceived accounting benefit (i.e. 'what' is available as a benefit of the system), accounting professionals (i.e. 'who' uses the system) effectively exploit ERP systems (i.e. 'how' the system is used) to achieve system effectiveness (i.e. 'economic benefits' of the system). Third, this study adds to the limited research on the implementation and post-implementation stages of ERP systems. Specifically, it considers the effectiveness of ERP system use rather than only the extent of ERP system use.

5.2 Managerial implications

Besides the theoretical implications, this study guides firms that use ERP systems on how to design and implement an ERP system to enhance system effectiveness. In addition, the results of our study can assist accounting experts to assess better the accounting benefits that an ERP system may offer. Hypothesis 1 testing result indicates that organisations should achieve a higher level of system use effectiveness by enhancing the perceived accounting benefits of ERP via appropriate training and communication mechanisms. Moreover, ERP consultants should be able to guide companies that are interested in including their accounting processes in an ERP system more efficiently. In addition, the Hypothesis 2 testing results should be of interest and value to practitioners, who can adopt actions related to accounting techniques and procedures to improve effective ERP system use, which in turn, enhances ERP system success. Finally, the results of testing Hypotheses 3 and 4 imply that organisations should recognise that effective system use can be a connecting device to translate people's

perceptions of accounting benefits into ERP success.

5.3 Limitations and future research

Our findings should be considered in light of several study limitations. First, our sample includes 120 respondents, 17.5% of which are enterprises that are in the stage of ERP implementation and 82.5% of which are in the stage of ERP post-implantation. The perceived accounting benefits may change in different stages of the ERP lifecycle, which may influence its effects on ERP system success. Future studies may consider investigating whether a difference exists between the stages of ERP implementation and ERP post-implementation to provide a more comprehensive evaluation of the phenomena investigated here. Second, because of time and budget constraints, the study adopted measurement scales that were originally developed in the context of developed countries. Thus, the scales may not truly reflect the nature of the study's constructs in the context of Vietnam, which is a developing country. This means that the results of the present study may have been affected by potential measurement bias. This problem could have been mitigated if the scales had been more extensively augmented by additional explored items and tested qualitatively before the field survey.

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Journal of Intelligence Studies in Business
Vol. 10, No. 3 (2020) pp. 80-95
Open Access: Freely available at: https://ojs.hh.se/

Financial intelligence: Financial statement fraud in Indonesia

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Received 18 May 2020 Accepted 26 October 2020

ABSTRACT Indonesia is currently in an honesty crisis, especially in financial governance, both in government and private institutions. Our study uses the concept of financial intelligence to identify and collect information related to financial affairs in an organization. We use the opinions of 76 auditors regarding various fraudulent attempts, both with fraudulent financial statements and other corrupt practices in organizations in Indonesia. Our important finding is that small companies are more likely to commit fraud due to weak supervisors than listed public companies. This is also more likely than family-owned companies and government level organizations. It was indicated by some respondents that local government level organizations with weak supervision are more likely to commit fraud than local governments with close supervision from urban communities. The results of the non-parametric relationship analysis show that although there is a possibility that the more experienced the auditor is, the more able they are to detect fraud and manipulation in the organization, the relationship is relatively weak. Other findings also show that auditors who have a CFE certificate find it easier to find fraud in the company.

KEYWORDS Bribes, financial intelligence, fraudulent financial statements, procurement of goods and services

1. INTRODUCTION

Audit-based research has an important role in the effort to identify fraudulent attempts at both the scale of private company organizations and public organizations. The term that is widely used is financial intelligence, which is an attempt to identify various fraud in financial transactions including embezzlement, money laundering, or other fraudulent and illegal transactions (Alavi 2016; Scott and McGoldrick 2018). Many cases in Indonesia lead to fraud involving parties related to the company. When viewed from a collection of numbers, fraud in company transactions is huge. The combined results of the ACFE analysis amount to 800,000 USD. According to the fraud triangle theory, the opportunities for an individual to commit fraud are based on opportunities, abilities, pressures, needs, and lifestyle. The impact is enormous, at a time when this fraudulent opportunity can take place (Suh et al. 2019; Charlopova et al.

2020). Investors and others have an impact on labor and company performance in the market (Karpoff 2020).

Fraud can occur in any sector, including the private sector, public services, and both national and international organizations (Lombardi et al. 2015; Charlopova et al. 2020). Indonesia has recorded massive cases of fraud since the government's efforts to eradicate corruption in the reform era (Lewis and Hendrawan 2019). Fraud and criminal acts of corruption involve many parties, conglomerates, public officials, company employees, government employees, religious leaders, political figures and even the public in various aspects of life (Jakimow 2018a). One of the cases involved the state company (BUMD) PT Garuda Indonesia Tbk. This airline was suspected of having released fraudulent financial statements. Regulators—in this case, the Ministry of Finance and the Financial Services Authority (OJK)—impose penalties on the parties involved, including the accounting firm, auditor, and PT Garuda Indonesia Tbk. The results of the state auditor's examination showed fraud in the 2018 earnings report. The company inflated profits for certain purposes. From the audit findings, the company should have suffered a loss of 244.95 million USD, but they actually recorded a profit of 809,840 USD.

We follow-up previous research, which only examines the fraud side of private companies (Holtfreter 2005; Lambsdorff 2002; Jeppesen 2019), and we expand by adding data from facts that occur in governmental organizations. This study also broadens the perspective through the financial intelligence model in viewing financial fraud in Indonesia. The role of financial intelligence is very important as a solution to various corporate frauds (Dorrell et al. 2012; Alavi 2016). This research is important for several reasons. As financial intelligence, this study will understand how fraud is committed within a company that can assist auditors in finding fraud from various sides in corporate governance. Second, understanding the various forms and patterns of fraud will greatly assist company leaders in detecting losses due to fraud, to prevent the allocation of resources to fraudulent units.

We hope this can contribute to the development of knowledge in the field of audit and fraud, and also be beneficial for auditing practices and good corporate governance practices. Research in the field of fraud is currently of interest in Indonesia. With the rise of corruption cases being revealed, more and more researchers are using the concepts and theories of fraud in observing the phenomenon of fraud and the issue of ethical and criminal violations. The interesting thing about this research is that most of the data were collected through in-depth interviews with selected informants and sources, although the survey results were used to present descriptive data. We chose auditors as informants. Most of the research results look at the impact of fraud on the economy and moral violations (van Ruth et al. 2017; Kendall et al. 2019; Roychowdhury et al. 2019; Dungan et al. 2019). Some researchers observe fraud motivation from the perspective of the fraud triangle theory (Suh et al. 2019; Malimage 2019; Bujaki et al. 2019), which is not context-specific or based on empirical evidence as in this study.

This paper's structure is as follows. First, we review the relevant literature on financial intelligence and its relation to financial reporting fraud. In the next section, we discuss the methodology we use, which follows a data collection method that uses a combination of surveys and in-depth interviews. In the next step, we present the findings in detail for each item on the form and add context on fraud in financial reporting. Finally, the conclusions are combined with a discussion of the research results and their implications for research and audit practice in future research.

2. THEORETICAL FRAMEWORK

2.1 Financial intelligence

The concept of financial intelligence (FINITE) is an effort to identify and collect information related to financial affairs in an organization (Alavi 2016; Scott and McGoldrick 2018). In addition to being used by the Police Department in Australia and several European and American authorities, FINITE also applies to legal and audit researchers. The use of FINITE in the audit field can be applied in special studies to prove various fraudulent attempts by accountants or financial managers in corporate organizations (Dorrell et al. 2012; Alavi 2016). The existence of FINITE is intended to identify various irregularities in financial transactions including money laundering, tax evasion, deliberate misstatement, and violations of other accounting rules (Dorrell et al. 2012; Alavi 2016; Scott and McGoldrick 2018).

The use of FINITE to identify suspects or victims in cases of fraud in corporate financial statements is an important challenge for

auditors in detecting corruption and fraud (Rudner 2006; Alavi 2016). Generally, as in previous cases, the auditor or the police investigate after the case was reported, however by using FINITE, the investigation and observation could be carried out before the report. There are major obstacles to not reporting a case of fraud that is found, for many reasons. In many cases, this includes recognition from individuals that they are victims of fraud, and the stigma and shame associated with this (Rudner 2006; Thony 1996).

2.2 Fraudulent financial statements

The output of the transaction identification and recording process is financial statements. This involves many parties, especially experts in accounting, who assess the reasonableness of using external audit services so that the presentation of financial statements is reasonable (Chychyla et al. 2019; El-Helaly et al. 2018). Many cases of fraud in financial reports are in the form of deliberate misstatement, inflating numbers, and manipulation of income, which have multiple purposes (Zager et al. 2016). This fraud is mostly carried out by management who truly understand the condition of the company (Habib et al. 2018; Chychyla et al. 2020). There are various ways to fraudulently manipulate financial statements, including unreasonable revenue recognition, hidden costs for certain purposes, and asset valuation that is not in accordance with IFRS (West and Bhattacharya 2016; Chychyla et al. 2020). Misappropriation of organizational assets and misstatement in revenue recognition is the most common means of fraudulent behavior. This includes revenue that is recognized but fictitious, premature income that is currently recognized, and incorrect income when adjusted (Zager et al. 2016; Habib et al. 2018; West and Bhattacharya, 2016). However, creating fictitious sales appears to be the most common method of manipulating income (El-Helaly et al. 2018; Zager et al. 2016). Various ways of manipulating income, reviewed in the literature, are presented in Table 1.

Table 1 Summary of the various modes of recognition of illegal income.

Technique	Source
There is a sales discount, but it is not recorded	Rezaee (2005), Coenen (2009), Albrecht et al. (2006)
Consignment sales are recorded as a normal	Rezaee (2005), Coenen (2009), Albrecht et al. (2006)
Shift sales from a future period to the current period	Coenen (2009), Hopwood (2008)
Early acknowledgment of legitimate sales	Coenen (2009)
Create a sales order invoice but the goods are shipped in the next period (bill and hold)	Lord and Robb (2010), Coenen (2009)
Hide the sales returns and deductions to increase sales and net income	Elder et al. (2010)
Minimizing the allowance for doubtful accounts, so that the debt burden is reduced	Rezaee (2005), Albrecht et al. (2006), Coenen (2009), Elder et al. (2010)
Bad debts that are not written off	Rezaee (2005), Albrecht et al. (2006), Coenen (2009), Elder et al. (2010)
Recognizes credit sales at the end of the accounting period, even though they have not been ordered, but the goods have been shipped.	Hopwood (2008)
Part or all of the goods have not been delivered, but are recorded as sales.	Coenen (2009)
Does not record the goods return transactions	Lord and Robb (2010)
The customer returned the item but it was not recorded	Rezaee (2005), Albrecht et al. (2006), Coenen (2009), Elder et al. (2010)
Manipulate cash receipts from the consumer as if the transfer from the bank is a cash receiver	Rezaee (2005), Albrecht et al. (2006), Coenen (2009), Elder et al. (2010)
Entering into additional agreements that change the terms of the previous agreement that do not qualify as sales under accounting principles	Lord and Robb (2010), Elder et al. (2010)
Transferring income between accounting periods, by determining an inappropriate cut-off period	Lord and Robb (2010)
Returned goods are recognized after the period ends	Hopwood (2008), Rezaee (2005), Albrecht et al. (2006), Coenen (2009)
Transferring the write-off of uncollectible accounts to the next period	Hopwood (2008), Rezaee (2005), Albrecht et al. (2006), Coenen (2009)
Fictitious sales transactions discontinued at the end of the accounting period	Rezaee (2005), Albrecht et al. (2006), Coenen (2009)
Sales and delivery documents are required	Hopwood (2008)
Decrease the note on a percentage of misstatements on settlement	Coenen (2009), Hopwood (2008)
Record gross income, not net income	Rezaee (2005), Albrecht et al. (2006), Coenen (2009), Elder et al. (2010)
Record invalid earnings or shipments	Lord and Robb (2010), Elder et al. (2010), Hopwood (2008)
Exaggerating real sales	Rezaee (2005), Albrecht et al. (2006), Coenen (2009), Elder et al. (2010)

Table 2 Improper ways of valuing assets.

Concealment Techniques and Methods	Source and quoted from
Inventory manipulation of goods in the warehouse	Wells (2005), Coenen (2008), Albrecht et al. (2006)
Inflation of the unit cost used to increase the value of the inventory	Wells (2005), Coenen (2008), Albrecht et al. (2006)
Obsolete inventory or other assets are not recorded according to impairment value or collection issues	Wells (2005), Coenen (2008), Albrecht et al. (2006)
The amount of inventory for the cost of goods sold is enlarged. Usually creating fake documents such as sheet counts	Wells (2005), Coenen (2008), Albrecht et al. (2006)
It is not appropriate to capitalize on the inventory and the cost of the beginning inventory	Wells (2005), Coenen (2008), Albrecht et al. (2006)
Should increase the discount on sales or the cost of inventory should not be reduced	Wells (2005), Coenen (2008), Albrecht et al. (2006)
Creating false records for the amount of inventory on hand to conceal it by fake shipments	Wells (2005), Coenen (2008), Albrecht et al. (2006)
Obsolete and slow-moving inventories are recorded as misstatements	Jones (2011)
The method for valuing inventory is changed according to the importance	Jones (2011)
The production overhead amount included in the inventory count is misstated	Jones (2011)
Inaccurate inventory recognition during the delivery process	Lord and Robb (2010)
Obsolete or unsold inventory is recognized	Lord and Robb (2010)
Inventory items are overbooked, without eliminating obsolete items or there is no provision for inventories whose value is reduced	Lord and Robb (2010), Coenen (2009)
The existence of illegal accounting of receivables	Albrecht et al. (2006), Wells (2005), Coenen (2008)
Accounts receivable from bad debts are not written off	Albrecht et al. (2006), Wells (2005), Coenen (2008)
Accounts receivable added unilaterally	Albrecht et al. (2006), Wells (2005), Coenen (2008)
There are several fictitious assets ordered to influence the total asset account on the balance sheet	Albrecht et al. (2006), Wells (2005), Coenen (2008)
The depreciation cost of an asset is increased by increasing or decreasing its useful life	Jones (2011), Albrecht et al. (2006)
Depreciation is not recorded properly	Albrecht et al. (2006), Wells (2005), Coenen (2008)
The market price of fixed assets is recorded at a higher rate, supported by an asset valuation document	Albrecht et al. (2006), Wells (2005), Coenen (2008)
The cost of acquiring assets is increased by cooperating with other parties	Albrecht et al. (2006), Wells (2005), Coenen (2008)
Intentionally misrepresenting securities information with the help of other parties	Albrecht et al. (2006), Wells (2005), Coenen (2008)
Manipulating the return of goods or purchases of goods in the previous period are recorded repeatedly	Albrecht et al. (2006), Wells (2005), Coenen (2008)
Increase the value of fixed assets	Albrecht et al. (2006), Wells (2005), Coenen (2008)
There is an impairment of assets that are not recorded correctly	Albrecht et al. (2006), Wells (2005), Coenen (2008)
Manipulation of estimated fair market value of assets	Albrecht et al. (2006), Wells (2005), Coenen (2008)
Backup manipulated	Albrecht et al. (2006), Wells (2005), Coenen (2008)
Inaccurate investment appraisal by way of wrong investment classification	Coenen (2009)
Amounts attributable to the merger or acquisition are not recorded correctly	Jones (2011), Coenen (2009)

Table 3 Various modes of manipulating against liability and expense.

Concealment Techniques and Methods	Source and quoted from
Improperly recorded current and long-term debt	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)
There is no documentation of the agreement and repurchase commitment	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)
Contingent payables are carried at excessively lower than fair value	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)
Enlarge financial ratios by inconsistently presenting long-term debt with current debt	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)
Purchases of goods that are recorded fairly or materials are not recorded	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)
Purchase returns and purchase discounts returned to the seller	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)
The cost of booking goods is not recorded	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)
Manipulating gross profit by attempting to change the cost of a sales item to another account such as other operating expenses	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)
The value of strategic assets such as buildings, accounts receivable, work equipment or inventory are not recorded at their correct value	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)
There are discounts, returns, and sales discounts, but these are not recorded as reduced costs	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)
Hiding expenses by manipulating the number of smaller expenses	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)
Shifting the amount owed in this period to the next period, or preventing employee debt in the next period	Wells (2005), Elder et al. (2010), Coenen (2008, 2009), Sterling (2002)
The amount of certain liabilities was not recorded correctly, including service payables or contingent payables	Sterling (2002), Coenen (2009)
Bring up obligations that should not exist	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)
Transferring accruals in this period which should be recorded in the next period or another period	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)
There is a net income that is recorded even though the income is received in advance	Sterling (2002), Coenen (2008, 2009), Wells (2005), AICPA (2007)

In addition to income, assets are objects that can be manipulated in financial statements. Efforts to manipulate asset values with the aim of increasing the value of assets on the balance sheet can be done so that certain ratios will be large (Wells 2005). Important ratios such as profit ratios, debt ratios, capital capacity ratios, and adequacy of funds are very dependent on the number of assets owned by the company. These actors usually use simple methods in presenting asset values, one of which is manipulating the physical inventory value of assets (Coenen 2008), increasing the cost per unit of assets so that the cost can be determined by themselves (Albrecht et al. 2006) and trying to restate the inventory of assets that are worthless, obsolete and almost unused (Jones 2011). Here are some opinions from experts on various ways of manipulating organizational assets (Table 2).

Apart from income, another easy aspect of finances to manipulate is a liability. Liability accounts have more openings for manipulation than faking sales transactions. Many criminals conceal liability transactions. Here are some opinions of experts in various ways to hide organizational obligations and expenses in Table 3.

Fraud in the government budget includes not only fraudulent financial statements but many aspects that can be manipulated. This includes the procurement and purchase of goods and services, manipulation of financial reports, manipulation of official travel costs, manipulation of granting company licenses, fraud in the use of natural resources, and fraud by law enforcers. The following are a summary of some opinions of experts on various ways to manipulate state money and abuse of office (Table 4).

Efforts to uncover illegal transactions usually include the following: hiding obligations, shifting transactions to the next period, transactions with related parties, and changes in accounting policies (Charlopova et al. 2020; Alavi 2016). If governance monitoring is weak, then many transactions with related parties will occur in the company, which results in fraudulent acts (Dorrell et al. 2012). Henry et al. (2007) revealed that there are

several weaknesses in the audit system, including the failure of the auditor to identify transactions of related parties that have special transactions. They also stated that notes on financial reports were intentionally misinterpreted or improper in order to influence financial policies issued by investors or report users (Kuhn and Siciliani 2013; Lombardi et al. 2015; Roychowdhury et al. 2019).

Table 4 Ways of fraud on Government organizations.

Concealment Techniques and Methods	Source and quoted from:
Purchase and Procurement of Goods or Services	
Mark-up price of goods	Miroslav et al. (2014), Ameyaw et al. (2012)
Purchase of fictional items	Mamedova et al. (2017)
Making roads and bridges in the forest but fictional	Graafland and van Liedekerke (2011)
Physical infrastructure development but not finished	Graafland and van Liedekerke (2011)
Purchase of goods for one unit, but recorded for two or more units	Ameyaw et al. (2012), Mamedova et al. (2017)
Purchase of goods for personal use, but paid for with government money	Ameyaw et al. (2012), Mamedova et al. (2017)
Physical infrastructure development that is not important	Graafland and van Liedekerke (2011)
The existing physical infrastructure development was rebuilt	Graafland and van Liedekerke (2011)
Waste of purchasing goods	Miroslav et al. (2014), Ameyaw et al. (2012), Mamedova et al. (2017)
Purchase of goods that do not match specifications	Miroslav et al. (2014), Ameyaw et al. (2012), Mamedova et al. (2017)
Financial Statement Manipulation	
Lots of transaction evidence original but untrue	Kuhn and Siciliani (2013)
Activity reports but no service activities	Othman et al. (2015)
Fictional official travel report	Kemp (2010)
Fake payroll signature	Othman et al. (2015), Kemp (2010)
Purchase reports are not real	Mamedova et al. (2017)
Unreasonable asset report	Mamedova et al. (2017)
State money reporting fraud in insurance investments	Kose et al. (2015)
Misstatement of regional company assets	Ameyaw et al. (2012), Mamedova et al. (2017)
Deliberate misstatement of state revenue	Ameyaw et al. (2012), Mamedova et al. (2017)
Manipulation on Official Trip Expenses	
Extending the period of official travel, even though it is less	Othman et al. (2015), Kemp (2010)
Adding personnel for official travel, even though it is fictitious	Glancy and Yadav (2011), Othman et al. (2015), Kemp (2010)
Take someone else on a trip, but at state expense	Glancy and Yadav (2011), Othman et al. (2015), Kemp (2010)
Create a fake hotel bill	Glancy and Yadav (2011), Othman et al. (2015), Kemp (2010)
Creating fake travel ticket invoices	Glancy and Yadav (2011), Othman et al. (2015), Kemp (2010)
Creating a fake travel certificate	Glancy and Yadav (2011), Othman et al. (2015), Kemp (2010)
Manipulation of Granting Business Licenses	
Asking entrepreneurs for a certain amount of money for the cost of obtaining a permit, even though it is illegal	Ferry and Lehman (2018)
Give additional permits to entrepreneurs for illegal additional land	Meehan and Tacconi (2017), Ferry and Lehman (2018)
Charging illegal fees for environmental permits	Meehan and Tacconi (2017), Ferry and Lehman (2018)
Receiving money from companies that violate the environment	Meehan and Tacconi (2017), Ferry and Lehman (2018)
Receiving bribes from companies that have experienced work accidents, so that they are not prosecuted	Meehan and Tacconi (2017), Ferry and Lehman (2018)
Receiving money from entrepreneurs for social purposes, but illegal	Meehan and Tacconi (2017), Ferry and Lehman (2018)
Cheating on the Use of Natural Resources	
Granting forest utilization permits on prohibited land	Huang and Liu (2014), Dincer and Fredriksson (2018)
Granting forest utilization permits, by cutting trees and destroying forests	Huang and Liu (2014), Dincer and Fredriksson (2018)
Received a certain amount of money to obtain mining business permits that destroy the environment	Huang and Liu (2014), Dincer and Fredriksson (2018)
Give permits to use prohibited natural resources (timber)	Huang and Liu (2014), Dincer and Fredriksson (2018)
Fraud by a Legal Officer	
Police and prosecutors help fugitive state fugitives to escape	Michels (2016), Gottschalk and Rundmo (2014), Ragatz et al. (2012)
The police and prosecutors received a certain amount of money to lighten the case	Michels (2016), Gottschalk and Rundmo (2014), Ragatz et al. (2012)
The judge lightly decided the defendant, by receiving a sum of money	Michels (2016), Gottschalk and Rundmo (2014), Ragatz et al. (2012)
A court officer arranges civil proceedings and wins either party	Michels (2016), Gottschalk and Rundmo (2014), Ragatz et al. (2012)
Court officials arrange the placement of prosecutors, judges, and other officers to receive leniency	Michels (2016), Gottschalk and Rundmo (2014), Ragatz et al. (2012)

3. METHODS AND OBJECTIVE

We used semi-structured interviews and surveys to collect data. The respondents we selected included auditors at an accounting firm affiliated with Big-4 in Indonesia. We distributed approximately 200 questionnaires to the respondents. In the questionnaire, we included items that asked the respondent's willingness to be interviewed. The questionnaires we sent were received, but only 76 returned, making the response rate around 38%. Only 21 out of 76 respondents who were willing to process the interview returned the questionnaire. Sequential mixed research combines the methods of collecting interview and survey observation data in an effort to explore survey results with semi-structured interviews (Subedi 2016).

The interview process is used to deepen the information obtained from the survey data collection. This study requires in-depth technical assessment, which requires clarification from experienced auditors with at least two years of experience. Many auditors are inexperienced and just guess when answering surveys, so they are not informative. Twenty-one people were available for video calls. Each interview lasted about 20-25 minutes, and we recorded the results of all interviews, except for three respondents who did not consent. All the data collected through our survey was tested for the relationship between the auditor's experience in the audit assignment and the ability to reveal fraud in the preparation of financial reports, both in the public and private sectors, using non-parametric statistical tests. The statistical analysis used was a phi-test. The phi-test is an associative test on a nominal data scale if the contingency table is 2 x 2. So, it can be said that the phi correlation coefficient is designed for dichotomized variables (Loeb et al. 2017).

4. RESULTS AND DISCUSSION

4.1 Descriptive statistical analysis

We have mentioned above that the respondents are auditors. The survey results related to auditors' perceptions are presented in the following descriptions including the experience of auditors, classification of public accounting firms, qualifications of public accountants, job public accountants who are willing to be interviewed, and audit experience of interviewees.

Based on the results of a survey of 76 auditors, the respondants predominantly stated that there was fraud in organizational governance, both in the public sector and in the private sector. From small to large-scale fraud, all reports related to manipulating financial reports and enriching oneself through illegal practices. However, even though they were aware of these practices, rarely did the respondents dare to reveal the incident for various reasons (64.47%, n = 49/76 respondents). These reasons include the fear of losing their job by clients, lack of protection for auditors, weak laws regarding the rights and obligations of auditors, and that the auditors have weak trust in Indonesian law. This finding is in line with the expert's opinion that the law has not guaranteed the rights and obligations of auditors in acting to reveal crimes.

There is evidence from research in Africa, for example, that no lawsuits are made by accounting firms outside of the absence of a legal system that protects accounting firms. This is because of high fear and worry (Salihu and Berisha-Hoti 2019; Kawadza 2017). The result is that fraudulent acts will continue to flourish if the legal system does not fully protect accounting firm auditors who disclose fraudulent acts (Cordis and Lambert 2017).

Table 5 Respondent audit experience.

Experience Range	Frequency	Percent
0 - 2 years	3	3.95%
2 - 6 years	14	18.42%
6 - 8 years	28	36.84%
Over 8 years	31	40.79%
Total	76	100.0%

Table 6 Classification of accounting firm.

Classification of Accounting Firms	Frequency	Percent
Big-4	7	9.21%
Domestic Non-Big-4	62	81.58%
International Non-Big-4	7	9.21%
Total	76	100.0%

Table 7 Qualifications of the public accountant professional.

Dimensions	Frequency	Percent
Public Accountant (Ak.)		
No.	2	2.63%
Yes.	74	97.37%
Total	76	100.0%
Chartered Accountants (CA)		
No.	17	22.37%
Yes.	59	77.63%
Total	76	100.0%
Certified Public Accountants (CPA)		
No	51	67.11%
Yes	25	32.89%
Total	76	100.0%
Certified Fraud Examiners (CFE)		
No	67	88.16%
Yes	9	11.84%
Total	76	100.0%

Weak law enforcement is one of the obstacles in eradicating fraud in doing business based on the results of the 2017-2018 Global Competitiveness Report released by the World Economic Forum. Even entrepreneurs feel dissatisfied when resolving business disputes in this condition (Birhanu and Wezel 2020; Sharma and Soederberg 2020). In some developing countries with weak legal systems, rulers develop legal systems and courts as a way not to ensure society is fair but to use law and courts as tools to justify and maintain the political status quo (Sharma and Soederberg 2020).

Conflicts of interest will be the main obstacle when auditors find irregularities in an organization's financial statements. On one hand. the auditor obtains an audit fee but on the other hand, maintains truth and independence (Singh et al. 2019). One thing to remember is that the decision is with the top management of the accounting firm, not on the auditors (Barua et al. 2020; Singh et al. 2019). Likewise, the decision by companies to use accounting firms depends on company management (Barua et al. 2020). Auditors face various challenges in dealing with fraud cases, in addition to risking professionalism as well as risking audit quality that is purely free from pressure (Quick and Schmidt 2018). The principle of auditor independence supports maintaining the reliability of financial statements. One of the public accounting services is to provide accurate and reliable information for user decisions. Every profession must pay attention to product quality, including the quality of the audit produced by an auditor (Barua et al. 2020; Quick and Schmidt 2018). The higher the quality of an auditor, the higher the client's trust in auditors, for example, investors, creditors, government, and the public to use financial reports (Singh et al. 2019; Quick and Schmidt 2018).

Table 8 The job of public accountants who are willing to be interviewed.

Public Accountant Job	Frequency	Percent
Partner	1	4.76%
Manager	4	19.05%
Senior Auditor	11	52.38%
Junior Auditor	5	23.81%
Total	21	100.0%

Table 9 Type of public accountant firm that was interviewed.

Types of classification of Public Accounting Firms	Frequency	Percent
Big-4	6	7.89%
Non-Big-4: Domestic	12	15.79%
Non-Big-4: International	3	3.95%
Total	21	100.0%

Table 10 Audit experience of interviewed respondents.

Experience Range	Frequency	Percent
0 - 5 years	3	14.29%
5 - 8 years	6	28.57%
8 - 10 years	8	38.10%
Over 10 years	4	19.05%
Total	21	100.0%

Based on the results of our interviews with selected respondents, generally speaking, that fraud in organizational governance is considered normal. The first cause is due to the fear that employees will lose their positions, so whatever changes and wishes come from management must be followed. The company strives to report a good performance in public, due to intense competition. Because of this, things can be done to preserve the company image, including manipulating financial reports. Pressure from investors to get the maximum profit is one reason for fraudulent financial statements.

Many believe that because of the difficulty of getting a decent work position, an employee can easily be forced to commit fraud in order to keep his or her job, even in high positions. This is in line with research (Ettredge et al. 2017; Quick and Schmidt 2018). The report from Certified Global Management Accounting (CGMA 2015) mentions that many employees in the UK work under pressure from managers, then another study reports that around 78% of people in the UK agree that big businesses are more likely to prioritize profits than high ethical standards (IBE 2018). In 2019-2020, the Supreme Audit Agency (BPK) finally revealed the results of an investigative audit of PT Asuransi Jiwasraya (Persero). According to BPK, the financial statements of the state-owned insurance company, Jiwasraya, are false financial reports (Sulistiyanto and Murtini, 2018). This has been occurring since 2006. Jiwasraya's profit achievement recorded in the company's financial statements was due to the engineering of financial statements, sometimes called “window dressing.” For example, in 2017, Jiwasraya received a profit of IDR 2.4 trillion. This profit was unnatural because there was fraud in the reserves in Jiwasrata's financial statements amounting to IDR77 trillion. In general, financial statement manipulation or fraud is committed because of many motivations, such as the wrong opinion of an informant in an interview that:

> *"… .. The manipulation in the financial statements is very high, many top managements are the main actors because of the many pressures, especially the pressure on obtaining bonuses and the pressure on high profits from shareholders ....".*

Other informants also conveyed other things:

> *"... many employees in the finance department feel obliged to follow orders from their superiors and are loyal, because the impact is that if they do, they will be fired, at least transferred to another department ..."*

This research is in line with Kaseem (2018), which says that the strong pressure from owners increasingly encourages company management to cheat in an effort to provide the best information for the company's performance. The research by Makhaiel and Sherer (2017) also shows employees and investors increasingly encourage management to cheat in financial reporting. The results of our survey found that 53% of the external auditors interviewed in this study had encountered suspicions of reporting cases of financial fraud during an audit and management is almost always involved in these. This is in line with Kaseem's (2019) study which found that financial reporting fraud is more likely to be carried out by management. The reason why management is most involved in fraud is the existence of high-profit pressure and bonus motivation.

Much of our in-depth study of informants is related to revenue recognition. Income recognition is the easiest to manipulate and difficult to detect by outsiders, in this case, investors. The foresight of auditors is important because they can see if the revenue recognition transaction is reasonable or not (Charlopova et al. 2020; Alavi 2016). Some developing countries have experienced cases of fraud, especially in the recognition of income, which is the area where most manipulations are made. Research from Dorrell et al. (2012) and Charlopova et al. (2020) reported that there were many cases of fraud on income abuse. In March 2020, in Indonesia, there was a hand-catching operation (OTT) conducted by the Corruption Eradication Commission (KPK) to one of the directors of PT Krakatau Steel

Tbk. The day after the OTT, it was revealed that the Director of Technology and Production of Krakatau Steel, Wisnu Kuncoro, was suspected as the recipient of a bribe in the case of procurement of goods and equipment at Krakatau Steel. The bribery was carried out by contractors, namely Kenneth Sutardja and Kurniawan Eddy Tjokro (Yudi) with an intermediary Alexander Muskitta. Apart from bribery, this fraud case is also related to regulating company revenue.

Apart from increasing income, misstatement and manipulation of assets are also vulnerable for financial statement fraud in Indonesia (Jakimow 2018b). The name PT Hanson International Tbk has been sticking out for a while. This property company has been linked with the scandal of two state-owned insurance companies, PT Asuransi Jiwasraya (Persero) and PT Asabri (Persero). Both Jiwasraya and Asabri place their customers' funds with a large enough nominal value in PT Hanson International Tbk. Apart from placement through shares, investment also flows through the purchase of medium-term notes (MTN) or debt securities. In the records of the Financial Services Authority (OJK), PT Hanson International was proven to have manipulated the presentation of the annual financial statements (LKT) for 2016. The OJK also imposed sanctions, both for the company and its main director, Benny Tjokro. In the examination conducted by the OJK, manipulation was found in the presentation of accounting related to the sale of ready-to-build lots (Kasiba) with a gross value of IDR 732 billion, so that the company's revenue rose sharply.

The results showed that some auditors agreed (n = 15 or 19.73%) that small companies have more opportunities for financial statement fraud than public companies on IDX. Meanwhile, at the government level, it shows that some auditors (n = 54 or 71.05%) agree that local government with weak supervision is more likely to commit fraud, compared to local governments with tight supervision from urban communities. For the case of private companies, however, our findings differ from studies in Egypt and the Middle East, and several other African countries, so their findings cannot be generalized that financial statement fraud is more prevalent in large companies (ACFE, 2016). However, ACFE only managed to collect evidence from five cases of fraud in Egypt and several other African countries, so their findings cannot be generalized. Meanwhile, for local governments, many studies show that when the government lacks supervision, the intensity of fraud is higher (Puspasari 2015). In the process of government administration and development in the regions, is very important to improve supervision of regional financial management so that the regional revenue and expenditure budget can be managed effectively, efficiently, and achieve the expected goals (Lewis and Hendrawan 2019). This is in line with the mandate of laws in the field of state finance, which implies the need for a more accountable and transparent state financial management system (Puspasari 2015). The results of our interviews with informants regarding corruption in the government:

> *"…… The biggest thing is shopping and bribery, both of them are related. So if the government wants to buy or procure goods, there will be very thick with the practice of bribery and gratification to officials who determine partners. So it is dominant in the procurement of goods ……"*

The procurement of goods and services is still a source of corruption cases in Indonesia. This is because one of the government expenditures has received a very large allocation of funds. Therefore, many parties, both government and civil society, are consistent in continuing to highlight this area (Mamedova et al. 2017). A researcher from Transparency International Indonesia (TII) said that the potential for corruption in several areas is dynamically changing, including the procurement of goods and services. The perpetrators also used different modes.

The biggest megaproject is the electronic identity card (KTP) project, commonly known as e-KTP, which was started by the Ministry of Home Affairs as the executor, in 2011-2012. The budget for this project reaches IDR 5.9 trillion. However, the Corruption Eradication Commission (KPK) said there were irregularities in the "(initial) budget discussion stage". In September 2012, the Business Competition Supervisory Commission (KPPU) also detected irregularities in the tender process. The KPK has been investigating the alleged corruption case of the E-KTP project since mid-2014. Over nearly three years, the agency examined 294 witnesses, named two suspects, and confiscated IDR 247 billion. Apart from the two defendants, the KPK also questioned 19 politicians who served as

people's representatives in the DPR in 2011-2012. Among them were Chairman Harahap, who was then chairman of Commission II (DPR government commission), and Setya Novanto, who at that time held the position of chairman of the Golkar Party faction. Perhaps most impressive in this case is the amount of funds that are suspected of being corrupt. Of the project value of IDR 5.9 trillion, the KPK said the funds that were corrupt reached IDR 2.3 trillion.

Another megaproject case in Indonesia, the Hambalang Project, initially only budgeted IDR 125 billion. Then, in the hands of Andi Mallarangeng, the project budget swelled to IDR 2.5 trillion. Andi Mallarangeng served as Minister of Youth and Sports at that time, as well as a member of the Board of Trustees of the Democratic Party. The recorded state losses from the misappropriation of the Hambalang project were estimated at IDR 243.66 billion. This is based on a financial audit conducted by the BPK. Apart from Andi Mallarangeng, the corruption case in the Hambalang project also involved the Chairman of the National Democratic Party of Urbaningrum. Now because of the corruption committed by cadres of the Democratic Party, the Hambalang project must stop. Until now, the Hambalang project has not made any more significant developments.

4.2 Non-parametric statistical testing

There is an important issue, namely the experience of auditors related to their ability to reveal fraud. We use Alavi-tabulation of the phi-test to test whether there is a relationship between audit experience and fraud detection ability in the audit process.

Table 11 The method used to carry out a fraud scheme in Indonesia.

Dimensions	Explanations
Improper asset valuation	Excessive inventory: ▪ Overbooking fixed assets ▪ Personal interests are capitalized ▪ Record excessive inventory balance ▪ Incorrect asset classification ▪ Borrowing costs for work-in-process projects are capitalized ▪ Some investments are not recorded ▪ Record low depreciation for less depreciation expense ▪ There are expenses which are capitalized as assets ▪ Excess capitalization of fixed assets
Misstatement in revenue recognition	Manager to get a bonus, an increase in income: ▪ Manipulate estimates and associated receipt items ▪ Record premature income as normal income ▪ Accounts receivable manipulated ▪ Income is deducted to avoid paying taxes ▪ Income is deferred ▪ There are fictitious discounts given on purchases ▪ Commission income is recorded in excess ▪ There is a fictitious sale ▪ Accounts receivable that are recorded is greater ▪ Exaggerate income by hiding costs ▪ Manipulate the allowance for doubtful accounts
Hidden obligation	Manipulation in contingent liabilities and provision: ▪ There are tax obligations and tax costs that are not recorded ▪ Misclassification of debt from long term to short term, or vice versa ▪ Underpayment of loan installments
Hidden costs	Avoid paying taxes by exaggerating expenses and costs: ▪ Does not record costs ▪ There are expenses at the end of the period that are not recorded ▪ There is a rental fee recorded as an asset
Incorrect disclosure	Doesn't reveal: ▪ Transactions with related parties ▪ Source of funds ▪ Director's remuneration
Cheating government officials	Doesn't reveal: ▪ Taking bribes for projects ▪ Accept bribes for SDA business permits ▪ Inflated the price of an item ▪ Fictitious purchase ▪ Appoint incompetent associates

Table 12 Alavi-tabulation of the relationship between audit experience and the possible ability to reveal fraud in financial statements.

Explanation		Audit experience				
		0-2 year	3-5 year	6-8 year	8 year up	Total
Likelihood of detecting	No	1	6	8	8	23
financial fraud	Yes	2	9	15	27	53
Total		3	15	23	35	76

Table 13 Phi test of the relationship between audit experience and the possible ability to reveal fraud in financial statements.

Explanations		Value	Approximate Significance	Exact Significance
Nominal by	Phi Cramer's V	.270	.134	.141
nominal		.270	.134	.141
Number of valid cases		76		

Phi Cramer's analysis shows that although there is a chance the auditor may find fraud if experienced, the relationship is relatively weak. The experience of an auditor is one of the factors that influence this ability because auditors who are more experienced can detect fraud in the financial statements (Sulistiyanto and Murtini 2018). Research by Corbella et al. (2015) also states that experienced auditors will have more knowledge of mistakes and fraud, which will result in better performance in detecting cases of fraud compared to inexperienced auditors. The results of this analysis also show that all auditors who have a Certified Fraud Examiners (CFE) certificate find it easier to find fraud in the company. This shows the importance of special professional education that can increase the ability of auditors to find fraud (Kassem 2018). Continuous professional development must focus on developing strong analytical skills and abilities in using forensic accounting and efforts to warn companies that in the future some companies are likely to collapse (Earley 2015).

Fraud is increasingly occurring in various ways that continue to develop so that the ability of auditors to detect fraud must also be improved. Auditors are required to be able to detect fraud in carrying out audit tasks. The problem that arises is that auditors have limitations in detecting fraud (Ulfah et al 2020, Handayani et al. 2016). Limitations by auditors will cause gaps between users of the auditor's services who hope that the auditor can assure them that the financial statements presented do not contain misstatements and instead reflect the actual situation. Each auditor has different abilities in detecting fraud due to several factors, for example, the workload faced by auditors, different levels of experience, and different levels of skepticism (Ettredge et al. 2017). There is evidence that most auditors do not understand fraud schemes well enough to understand the high risk of fraud and that in the quality of the audit process, knowledge of fraud, training, and experience are the most important factors in detecting fraud (Othman et al. 2015).

5. CONCLUSIONS

Various acts of fraud in organizations have happened around the world. In Indonesia, for example, the cases of fraud happen mostly in companies where there is the recognition of income that is not acknowledged by IFRS, as well as fraud in asset valuation which results in the manipulation of financial statements. In contrast to government organizations, fraudulent acts mostly involve the purchase and supply of goods, which are followed by bribery and inflating the price of goods. Similar results also occurred in Japan, Britain, Egypt, and the United States. Our findings also state that financial reporting fraud in Indonesia is more common in small companies and is very common in companies that are not listed on the Indonesia Stock Exchange (IDX), and also in family-owned companies and companies that prepare consolidated financial statements. Meanwhile, at the government level, we show that some auditors agree that local government levels with weak supervision are more likely to commit fraud, compared to local governments with tight supervision from urban communities.

6. FUTURE RESEARCH

Phi Cramer's analysis shows that while the audit experience may increase the likelihood of detecting fraud, the relationship is relatively weak. Other findings also show that all auditors who have a CFE find it easier to find fraud in companies. This shows the importance of special professional education that can detect fraud in increasing the ability of auditors to detect fraud. Future research opportunities should explore the fraud profile on the recognition of revenues, expenses, and asset capitalization with an in-depth approach to specific informants. Then it would be interesting to explore the reasons why auditors are not willing to disclose fraud. This will be useful for auditors in developing a good audit scheme to detect fraud. The implication of this research will be to develop a more sophisticated audit model in terms of plans, methods, sampling, and audit mechanisms. This research has identified the types of fraud, both in the private and government sectors. This study can be used as a reference in the initial process of identifying fraud in audit planning. The limitations of the study are related to the difficulty of moving to the field due to large-scale social restrictions in several regions in Indonesia, so the data we gathered is limited.

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