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Business Intelligence (BI) as Simulacra— A radical reflexive look at the BI & analytics sustenance of strategy work

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Julkaisun nimike
Liiketoimintatiedon hallinta (Business Intelligence (BI)) vääristyneenä representaationa — radikaali refleksiivinen katsaus BI:n ja analytiikan rooliin osana strategiatyötä

Tiivistelmä
Strategiatutkimusta leimaa teknologian ja erityisesti liiketoimintatiedon hallinnan (Business Intelligence, BI) ja analytiikan keskeinen rooli strategiatyön tukena. Hyödyntäen etnometodologisia käsitteitä reflektio ja refleksiivisyys, tämä tutkimus osoittaa radikaalin refleksiivisen näkökulman arvon soveltamalla Baudrillardin simulaatio- ja simulakra-käsitteitä sekä Peircen semiotiikkaa. Kehittämällä radikaalia refleksiivistä diskurssia tutkimalla liiketoimintatiedon hallintaa vääristyneenä representaationa tämä väitöskirja tarkastelee kriittisesti BI:n ja strategian välistä suhdetta. Siten tutkimus tarkastelee diskursiivisia käytäntöjä, jotka sisältyvät deterministisiin, humanistisiin ja jälki-humanistisiin teksteihin BI- ja strategiatutkimuksessa. Tämän valossa väitöskirja väittää, että nämä tarkastelut eivät riittävästi huomioi BI:n luonnetta ja merkitystä strategiatyössä. Väitöskirjan havainnot osoittavat, että tutkijoilla on taipumus antaa teoreettinen etusija ympäristölle ja tuloksille (jossa BI nähdään rekvisiittana, joka täydentää strategian kehittämistä) tai organisaation kontekstille (jossa BI redusoidaan niihin kyvykkyyksiin, jotka tukevat emergentin strategian kehittämistä). Tässä kontekstissa BI:n luonne näkyy sen käsittelyssä "mustana laatikkona" tai "itsestäänselvyytenä" ymmärtämättä sen todellista merkityssisältöä. Tämä väitöskirja edistää postmodernin ja posthumaanin tutkimuksen agendaa, joka tässä liittyy BI:n rooliin strategiatyössä, joka pyrkii uudelleen hahmottamaan BI:n radikaalisti postmodernissa ja post-humaanissa tutkimuksessa. Ensiksi BI nähdään sosiaalisesti rakentuneeksi ilmiöksi, toisin sanoen, todellisuuden representaatioksi, joka voidaan ymmärtää vain ihmisten käsitysten kautta. Toiseksi, opinnäytetyö teoretisoi BI:n roolia liikkeelle panevana voimana strategian rakentamisessa, mikä avaa uusia väyliä strategian ymmärtämiseen tavalla, johon enenevässä määrin vaikuttaa teknologian kehitys. Tämän uudelleenkäsitteellistämisen seurauksia strategian kehittymiselle tutkitaan.

Asiasanat
business intelligence (BI), big data, analytiikka, strategia, postmodernismi, refleksiivinen analyysi, posthumanismi, semiotiikka

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Abstract
Strategy research is premised on the centrality of technological sustenance, BI and its analytics in particular, for conducting strategizing activities. Drawing on ethnomethodological conceptualizations of reflection and reflexivity, the thesis demonstrates the value of a radical reflexive account through the application of Baudrillard's simulation and simulacra and Peirce's semiotics. Through its development of a radical reflexive discourse of BI as simulacra, this thesis critically examines the study of the BI–strategy couplet and the lessons to be learned from this perspective. As such, the thesis investigates the textual practices that comprise the BI and strategy research in determinist, humanist, and post-humanist writings. In light of this, the thesis argues that these treatments do not fully engage with the status and nature of BI sustenance. The findings of the thesis indicate that scholars tend to give theoretical primacy to the environment and outcome (in which BI is viewed as a prop that supplements prospective strategy formulation), or organizational context (in which BI is reduced to its capabilities that support the emergent character of strategy formation). In this context, BI itself tends to fade away into a sea of taken-for-granted assumptions regarding its nature. This taken-for-granted nature of BI sustenance is apparent in its treatment as a "black box" or "self-evident" thing. In response, this dissertation advances an agenda for postmodern and post-human scholarship in BI sustenance and strategy, in which it seeks to re-conceptualize the concept of BI in radically postmodern and post-human notion. First, BI is re-conceptualized as a socially constructed phenomenon, that is, a representation of a reality that can be known only through human images and representations. Second, the thesis theorizes BI as a "prime mover" of the doings of strategy, which will open new avenues for understanding strategy work differently as it is increasingly suffused with ubiquitous technology sustenance. The consequences of this reconceptualization for strategy emergence are explored.

Keywords
business intelligence (BI), big data, analytics, technology, sustenance, materiality, strategy, emergence, postmodernism, reflexive analysis, semiotics

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Yassine Talaoui

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1 INTRODUCTION

1.1 Background to the study and the research gap

Today's competitive landscape is shaped by the fourth industrial revolution, digitization, the internet of things, pandemic repercussions, and a post-pandemic 'new normal'. This context mixes indistinguishably the biological, the physical, and the digital milieux (Schwab, 2017; Volberda, Khanagha, Baden-Fuller, Mihalache, & Birkinshaw, 2021) and produces a new competitive landscape that alters the modus operandi of strategy work (Fitzgerald et al., 2014; Hanelt et al., 2020; Rogers, 2016; Volberda, 2021). This new reality generates an exponential growth of data that challenges practitioners and academics dealing with theories and empirics of cognition and action (Van Knippenberg et al., 2015; Volberda, 2021).

In this setting, Business Intelligence (BI) and its analytics serve as a form of sustenance available to organizations to help them address information overload, new digital trends, and rules of cooperation and competition for value creation and capture (Constantinides et al., 2018; Jacobides et al., 2018; George et al., 2016; Hautz, Seidl, and Whittington, 2017; Volberda et al., 2021). A significant body of research recommends including BI in strategy practices to derive value through intelligence about the internal and external environment, and suggests that BI changes the operational context of strategy making (e.g., Constantiou & Kallinkos, 2014; Davenport, 2014; Varian, 2010). Below, I explore the changing context of strategy and how BI changes the prescriptive undertone of traditional deliberate strategy.

The prescriptive tradition of strategy assumes structured, quantitative, and intentionally collected data that feeds into the decision-making process (Pfeffer & Sutton, 2006). Prescriptive models of strategy are representative of the content and planning schools of strategy that assume a traditional planned and deliberate strategy formulation and outcome in a Schumpeterian market. The dynamism and uncertainty inherent to that market force companies to collect and monitor intelligence on all the industry players to foresee any disequilibrium that would jeopardize their market positioning (Constantiou & Kallinkos, 2014; Priem, 2013). The excessive focus on the environmental contingencies and the rising influence of industrial organization economics (Bain, 1956; Mason, 1939, 1949; Porter, 1979) on these schools of strategy produce an outright focus on deductive statistical analytics systems. Those systems follow models abstracted from the structure-conduct-performance-paradigm (S-C-P) (Bain, 1956, 1968; Mason, 1939), which

assumes homogeneity among firms within the same industry (Hatten & Schendel, 1977). The systems therefore follow an outside-in sequence of industry analysis to determine the position of the firm vis-à-vis its rivals, to investigate market structure (Hoskisson, 1999), and model the influence of both strategy and structure on the firm's performance (Hitt, Arregle, & Holmes, 1998). Conversely, internal proprietary research, rooted in organizational economics with its transaction costs emphasis (Williamson, 1975, 1985) and agency theory (Coase, 1937), creates a need for intelligence analytics capable of tracing and illustrating the inner structural logic and functioning of the firm, and of defining the key variables necessary to measure, evaluate, and understand the influence of the firm's internal mechanisms on strategy and performance (Godfrey & Hill, 1995). This shift to the firm results in the need for BI and its analytics systems to capture the organizational capabilities of the firm, anticipate reactions of competitors, as triggered by actions initiated by the focal firm (Bettis & Hitt 1995), and to examine the development and accumulation of knowledge within a firm and its competition. As such, BI and its analytics systems prioritize necessary input to strategy formulation through a systematic environmental analysis consorted with an appraisal of the firm's internal distinctive competence (Selznick, 1957).

Unfortunately, swiftly constructing decisions relative to environmental changes is easier said than done; especially due to the combination of rigid inertial forces and the inability of managers to assess disruptions and decipher meaning from what might seem merely noise (Kaplan, 2008; Knight, 1965). Such a commotion shakes the management of organizations a great deal and poses a stiff challenge for strategy work, which behooves managers to match their interpretation of what is going on with making sound strategic choices (Bower, 1970). This literature argues that turbulence in the environment cannot be pictured as a set of easily identifiable indications and pinpoints managerial cognition as a major player to muddle through ambiguities (Walsh, 1995). The rationale, herein, is that managers' frames of interpretation, that serve to interpret and translate signals into decisions, exert a major influence on strategy work (Daft & Weick, 1984). Those same frames also orchestrate strategy work during upheavals (Barr, 1998; Tripsas & Gavetti, 2000).

However, prior research indicates that managers' planning analysis, rooted in the linear sequential model of development (Van de Ven, 1992) can fall prey to sequential rationality, which is irrelevant as both individuals and organizations can only achieve bounded rationality (Cyert and March, 1963; Simon, 1957). Therefore, managers' planning analysis struggles to generate intelligent solutions for the 'wicked' issues and actions leading to and supporting strategy formation (Huff & Reger, 1987; Mason & Mitroff, 1981). At the individual level, cognitive constraints limit managers' ability to draw a comprehensive model of the world; at

the organizational level, strategic assumptions engender a politically motivated behavior among actors, resulting in a process resembling muddling through (Lindblom, 1963). Such assumptions underpin the rationale that strategy emerges from an "organized anarchy" (Cohen et al., 1972). Strategy thus emerges from an adaptive, incremental learning process, where means and ends are intertwined (Fredrickson & Mitchell, 1984), implicit, broad and non-quantified (Quinn, 1980). Furthermore, that process encompasses everything a company does, and transcends Porter's chain of causality (French, 2009; Porter, 1997). As Mintzberg et al. (1998, p. 119) put it, "what is wrong in seeing strategy in everything a company does or consists of?" and "why must there be any such chain of causality at all, let alone having to run in one direction?" Furthermore, sequential planning and contingency theory, with its *either/or* best decision, cannot cope with the challenges of technical innovations (Henderson & Clark, 1990), regulatory changes (Smith & Grimm, 1987), or market crises (Haveman, 1992) that constantly jeopardize the sustainability of competitive advantage of well-established conglomerates, let alone new entrants. This reality raises a new alternative acknowledging the *both/and* potential solutions to cope with the rising level of complexity and swiftness that decision-makers ought to deal with when balancing paradoxical scenarios (Smith & Lewis, 2011).

Moreover, none of the outside-in views of strategy (e.g., positioning, planning) or the inside-out forms (e.g., the resource-based view) denies people an agential role, through cognitive and discursive practices, or focuses on the processes by which people deal with BI (Constantiou & Kallinkous, 2014), let alone the practices that entangle both of them. Contrary to the traditional prescriptive school of strategy, BI deals with unstructured big data that is not collected intentionally but in a haphazard and heterogeneous modus operandi (Constantiou & Kallinkous 2014; Anderson, 2008). As such, BI befits a different character of strategy that is enmeshed in the doings and sayings of people (e.g., Jarzabkowski, 2007; Johnson et al., 2007). In this vein, a sociological lens to explore strategy anew (Whittington, 2007) catches the interactions of actors as they incorporate BI into strategic activities and investigates the outcomes pegged to its usage in disseminating insights to actors engaged in the social practice of strategy work (Bakke & Bean, 2006; Garreau, Mouricou, & Grimand, 2015; Jarzabkowski & Kaplan, 2015). As a result, strategy-as-practice (SAP) seems to provide the social ground for the doings of strategy that helps us view the human and the material as part of a social order, not as a structure or resources (Constantiou & Klinkous, 2014).

Accordingly, within the SAP stream, strategy research adopts a sociological eye (Whittington, 2007) to explore the doings of strategy (Jarzabkowski & Spee, 2009) with things (Jarzabkowski & Kaplan, 2015) and in space (Jarzabkowski et al.,

2015). This implies the performativity of these doings that entwine the realities of both the human and the material and afford different manifestations of strategizing activities (Cabantous, Gond, & Wright, 2018). Therefore, the doings of strategy shift the traditional focus of strategy research on epistemological inquiries (Wright et al., 2017) to ontological questions about the status and agency of the material and the humans who shape the realities of the doings of strategy (Cabantous et al., 2018; Garud et al., 2018). These realities do not pre-date the practice of strategy but are continuously "constituted, de-constituted, and reconstituted" (Cabantous et al., 2018, p. 412; Garud et al., 2018) in situ, and therefore cannot be fathomed as a representation of a pre-existing reality, but rather a reality that comes out from the performativity of the doings of strategy that could be captured by adopting a different stance (Cabantous et al., 2018). As a result, materiality is paramount in SAP research because material affordances provide strategy workers with the ability to strategize in ways that they could not have known of before (Leonardi & Barley, 2008). In the SAP literature, the material/social relationship is central to our normative understanding of who is a strategist and what is strategizing (Balogun, Jacobs, Jarzabkowski, Mantere, & Vaara, 2014; Callon & Law, 1997; Jarzabkowski, Spee, & Smets, 2013). This is clear in the work of Callon and Law (1997) who stress that the human and material artifacts become entangled in the doings of strategizing activities to the degree that the strategists arise through their embodied interactions with a range of material artifacts that make such an identification possible.

In this context, SAP scholars conceptualize strategizing processes and meaning-making as a materially mediated stream of activities in which strategists accomplish tasks using materials (e.g., Bourgoin & Muniesa, 2016; Dameron, Lê, & LeBaron, 2015; Knight, Paroutis, & Heracleous, 2018; Whittington, 2015). Meanwhile, a plethora of SAP studies focus on the affordances of sociomaterial resources (technologies, tools-in-use, sites, websites, etc) that shape the strategy work being performed and stimulate the actions of organizational members engaged in its doings (e.g., Buergi, Jacobs, & Roos, 2005; Denis, Langley, & Rouleau, 2006; Jarzabkowski, Giulietti, Oliveira, & Amoo, 2013; Jarzabkowski & Seidl, 2008; Spee & Jarzabkowski, 2009; Spee & Jarzabkowski, 2011; Wright, Paroutis, & Blettner, 2013). These studies show that materiality shapes strategizing activities by enabling or constraining practices of the agents involved in it and their meaning-making (Bakke & Bean, 2006; Garreau et al., 2015; Jarzabkowski & Kaplan, 2015).

Although SAP highlights the mediating role of technology in structuring organizational practices, and the massification of strategizing activities (Orlikowski & Scott, 2008; Whittington, 2015; Wright et al., 2013; Zammuto,

Griffith, Majchrzak, Dougherty, & Faraj, 2007), it takes the nature of the material, technologies in particular, for granted and relegates it to the background as a mediator or usage prop (Orlikowski & Scott, 2008; Zammuto et al., 2007), which cannot leap over the tangential treatment of the relationship between strategy (as the social) and technology (as the material). In light of the above, the question of the status of material technologies, BI in particular, and how it joins strategy to form a 'genre' that structures the activities of managers and other organizational members (Levina & Orlikowski, 2009; Orlikowski & Yates, 1994; Seidl & Whittington, 2014) is left untreated.

1.2 Research objectives and questions

The rising centrality of BI in strategy work not only pushes us to rediscover its status within our strategizing practices (Orlikowski & Scott, 2008; Zammuto et al., 2007), but also prompts a rethinking of the relationship of the human and the material (Bailey, Faraj, Hinds, Krogh, & Leonardi, 2019), of the nature of strategizing (Volberda, Baden-Fuller, Birkinshaw, Khanagha, & Mihalache, 2018) and of organizing (Bailey et al., 2019), and also of relational and sociomaterial analysis (Kuhn et al., 2017; Leonardi & Barley 2010, Lê & Spee, 2015; Orlikowski & Scott 2014) to attend to its place in our world. The unequivocal diffusion of BI in strategy work prompts us to rethink the division between humans and objects (Bailey et al., 2018) because the BI/ strategizing couplet is, by extent, rooted in the material/social separation, which implies that contemplating the relationship between BI and strategizing calls into question the distinction between the material and the social (Arnold, 2003; Barley, 1998; Leonardi & Barley, 2008).

The notion of BI in particular and technology in general stems from the Cartesian (mind/body) dualism that imbues technological determinism, and is institutionalized as truth in the interplay of power-knowledge (knowledge begets power, which in turn shapes knowledge and by extension produces it anew) that shapes all discourse about its reality (Foucault, 1980; Grandy & Mills, 2004; Knights & Morgan, 1991). In parallel, the subject of technology also drives humanist and post-humanist accounts (Leonardi & Barley, 2010; Orlikowski, 2010) of both whether technology is out there in the material universe irrespective of our minds, and how we use it as in realist ontology, or whether technology depends on our shared interpretations as a society to assign meaning to it, as in social constructionism, and therefore it is enacted in practice by what it affords in situ to organizational actors (Boudreau & Robey, 2005; Faraji & Pachidi, 2021; Leonardi, 2013; Pachidi, Berends, Faraj, & Huysman, 2020; Zammuto et al., 2007).

However, much research on technology sustenance—particularly that of BI—in management and organization studies (MOS), strategy research, informatics scholarship, and science and technology studies (STS) involves establishing the status of technology vis-à-vis the conventional wisdom on the way in which strategy work is usually done. The aim of these expositions is to articulate an agenda that takes the material affordances of BI seriously, bringing together technology and strategy (e.g., Whittington, 2014; Vaara & Whittington, 2012). However, the bulk of this literature overlooks the status of technology—and BI in particular—and the forces that produce and shape our thinking about it, not as a prop or artifact but as a reality (Grandy & Mills, 2004). Moreover, there is scant attention paid to the relationship of BI and strategizing, how we construct this couplet in our written scholarly work, and how our writing reflects such a relationship. Despite that relationship being central to strategy, management, technology, and organization studies, there is a paucity of work investigating how scholars reflect this relationship in their contributions.

Against this backdrop, this dissertation pays particular attention to the *how* of this relationship and does so with reference to two principles. The first is the premise that scientific knowledge is socially constructed (Locke & Golden-Biddle, 1997). Research adopting that premise permeates both the field of sociology of science (Knorr-Cetina, 1981; Latour, 1982; Latour & Woolgar, 1979; Zuckerman, 1987) and that of organization studies (e.g., Locke & Golden-Biddle, 1997, Astley, 1985; Burrell & Morgan, 1979; Daft, 1983; Weick, 1989). The assertion is that knowledge is not an *objective entity* enjoying a distinct and separate existence from the knower but something that cannot be fathomed as isolated from the knower and the meaning-making context normal to it and in which social practices and dynamics enact its meaning and what we come to know as knowledge (Locke & Golden-Biddle, 1997; Knorr-Cetina, 1981; Winsor, 1993). This constructionist view does not take for granted the role of knowledge as a report of events and facts that compose our world, instead treating it as problem open to inquiry (Knorr-Cetina, 1981; Locke & Golden-Biddle, 1997). As such, this position permits the thesis to avail itself of a reflexive look at the literature not only to comprehend its findings, but also to perceive the ways whereby the intended meaning of the authors' conclusions is conveyed within the boundaries of the scientific communities that explore the topic of BI and strategizing (Knorr-Cetina, 1981; Locke & Golden-Biddle, 1997). The second premise of this thesis is that scientific texts carry active agency, which should not imply that texts are independent entities, but that what is meant by a text is uncovered by breaking it down to its constituents through the process of analysis of rhetoric, narratives, and established assumptions (Locke & Golden-Biddle, 1997, p. 1025; Gross, 1990; Winsor, 1993).

This thesis therefore examines how the relationship is constructed in the available literature by developing a grounded theory of the BI-strategizing couplet. The theory draws on the tradition of social scientists investigating scientific texts to unveil the rhetorical means authors rely upon (e.g., Davis, 1971, 1986; Knorr-Cetina, 1981; Gephart, 1986, 1988; Gusfield, 1976; Latour & Woolgar, 1979; Locke & Golden-Biddle, 1997; McCloskey, 1994), and, furthermore, to analyze the discourse and language of scientific literature (Winsor, 1993; Yearley, 1981; Zuckermann, 1987).

In so doing, this thesis investigates "the discursive nature" of the literature on BI (Grandy & Mills, 2004, p. 1155) by taking account of Knights and Morgan's (1991, p. 253) depiction of discourse "as a set of ideas and practices which condition our ways of relating to, and acting upon, particular phenomena". The following question is therefore central: *What causes the discourse on BI and its relationship with strategy to emerge, develop, and reproduce? and how can an alternative discourse be established?*

The endeavor requires fleshing out the conditions that characterize this research tradition, that is, the "set of dominant philosophical assumptions or world views that inform the work of researchers" (Orlikowski & Baroudi, 1991, p. 2) to move them toward the body of knowledge that we have today on the BI–strategy couplet. The result should be to make the discourse about that couplet "both thinkable and practical" (Knights & Morgan, 1991, p. 252). This type of analysis approaches scientific literature as data in order to investigate the reasoning and assertions contained within texts (e.g., Davis, 1986; Gephart, 1986, 1988; Gusfield, 1976, 1981; Knorr-Cetina, 1981; Locke & Golden-Biddle, 1997; McCloskey,1994). Investigating scientific texts as data from a constructivist perspective occupies center stage in this thesis for it makes it possible to view BI-strategizing as a constructed subject and to unearth the meaning of scientific texts from both their findings and also the process of developing arguments into knowledge destined to influence how we view, and think about, a certain topic (Locke & Golden-Biddle, 1997).

1.3 Dissertation scope, position, and contribution

Strategy, management, and organization theory scholars borrow from various disciplines to address a strategy or organization phenomena, build a theoretical contribution, communicate it to practitioners and scholars (Corley & Gioia, 2011). Similarly, the tenet of this thesis is to carry a theoretical contribution, as opposed to an empirical or methodological one, to advance our comprehension of a fact or

a situation (Corley & Gioia, 2011; Hambrick, 2007). In this regard, I follow the recommendation of Corley and Gioia (2011, p. 13) to orient myself toward pre-science in my theorizing that is "…the process of discerning or anticipating what we need to know, and of influencing the intellectual framing and dialogue about what we need to know".

To inspect the set of circumstances that construct the BI and strategizing relationship, this thesis resorts to scientific databases and Academic Journal Guide (AJG) ranked journals. The analysis does not exclude any scientific field to allow for a comprehensive and multidisciplinary bundle of empirical and conceptual works drawing on various epistemological, ontological and methodological orientations. The conclusions of this thesis are informed by evidence collected from research on BI and strategizing spanning almost 40 years (2017–2020). The data were harvested in four rounds of systematic searches that covered the bulk of publications on BI and strategizing from 1985 to 2020. Those publications cover science and technology, information systems, computer science, strategy, marketing, operations research, and organization and management studies.

This reflexive journey investigates how the scientific literature outlines the circumstances suited to the 'BI-strategizing' couplet. Accordingly, I started by hypothesizing the nature and the definition of BI. In light of this, I started constructing conceptual dimensions and categories by carefully examining every section of the texts (that is, the abstract, introduction, theoretical foundations, methodology, results, discussion, and conclusion) to identify textual arguments and narratives (Locke & Golden-Biddle, 1997). I examined views on BI in each article, the theorizing and assumptions behind its conceptualizations, and its links to strategizing. My conclusions, interpretations, conceptualizations, dimensions, and labels are inductively and abductively derived from the data supporting the articles' theoretical foundations, methodologies, and findings. Accordingly, my chosen research strategies are the 4 whorls of grounded theory as advised by Boje (2018) to render this inductive process consistent with abduction, and therefore verify and test the theoretical conclusions. This thesis adopts postmodernism for its linguistic turn and Peirce's post-humanism for its ontological turn, and as such, deviates from other hermeneutic interpretivist accounts and classic positivist treatments of the material and BI found in science and technologies studies (STS). That is because it does not follow any "plug-and-play" method for empirical studies. The thesis brings together grounded theory coding, ethnomethodological reflection and reflexivity, Derrida's deconstruction, co-citation analysis, and the topic modeling of the Latent Dirichlet Allocation (LDA) to contribute to the strategy literature and science and technology studies.

This thesis articulates a postmodern and post-human perspectives on BI sustenance of strategy work that addresses the nature of BI in the literature and its relationship with strategy, in particular. It follows a reflexive investigation of the BI literature to unveil its "particular set of 'truths' and [question its] underlying assumptions" (Grandy & Mills, 2004, p. 1154). This choice stems from the lack of reflexivity in BI and strategy research (Whipp, 1996; Grandy & Mills, 2004). I derived inspiration from Grandy and Mills (2004)'s unsettling treatment of the accepted 'truth' of strategy, and the critical study of the discourse on corporate strategy by Knights and Morgan (1991) and the reappraisal of corporate culturalism by Hancock (1991). A reflexive exploration seeks to substitute the factual realm with the representational (Hassard, 1996; Gergen, 1992; Linstead & Grafton-Small, 1991). Therefore, this reflexive analysis seeks not to supplant previous ways of theorizing BI but attempts to "extend our inquiry of BI beyond its usual investigation" (Grandy & Mills, 2004) by offering an alternative understanding of it by "questioning the basic assumptions underlying all worldviews and even the possibility of worldviews as human means of conceptualizing the world" (Gephart, 1996b, p. 212) and dealing with the creation and reproduction of the social and the natural (Grandy & Mills, 2004; Pollner, 1991).

The reflexive exploration at the core of this thesis applies ethnomethodological formulations of reflection, endogenous reflexivity, and radical reflexivity. It aims to dismantle some more persistent legacies of the ontological basis "outer rim" upon which the discourse of the BI-strategizing couplet becomes self evident and is received as adequate (Pollner, 1991; Grandy & Mills 2004). The current research then re-conceptualizes the topic to offer an alternative view that incorporates BI into strategizing activities and strategy research. Accordingly, I examine the consequences of such a reflexive view for exploring BI in strategy and informatics research via seven essays that make up this dissertation (see, Figure 1). The first three essays discuss the factual domain of BI research and illustrate the reflection aspect. The domain in question combines technological assumptions and variables from strategy and organization theory. I explain endogenous reflexivity in the fourth and fifth essays and attempt to re-conceptualize BI sustenance and strategy as socially constructed phenomena. The sixth and seventh essays present a radically reflexive exploration and semiotic reconceptualization of BI sustenance and strategy that can be exemplified by Baudrillard's notions of simulation and simulacra (1983; 1994) and Peirce' semiotics (1867,1906). The method employed unveils the contradictions that—owing to a disregard for reflexivity—turn technological, humanist, and post-humanist representations of BI into simulacra, which Gephart describes as "copies of models representing a reality that does not exist apart from these representations" (1996, p. 202). The seventh essay draws

upon Peirce' semiotics to re-conceptualize BI and rehabilitate its status and the inquiry into its reality as a 'prime mover' of the doings of strategy.

This reflexive exploration of the nature of BI and its relationship with strategizing joins previous attempts to revise the status of the material in practice theory (e.g., Reckwitz, 2002b; Schatzki, 2001; 2005; Knorr-Cetina, 2001; Pickering, 2001). In so doing, this thesis also responds to the call of Bailey et al. (2019) to attend to the new ways emerging technologies enable us to explore organizational phenomena and the call of Li (2016) for more research on patterns of co-evolution between signs. The thesis also responds to the call of Seidl and Whittington (2014) by extending SAP research beyond tall ontologies' focus on macro and micro levels of analysis through Baudrillard's and Peirce's semiotics to reveal human and material actors and their connections. By extending Seidl and Whittington's (2014) flat ontologies to Baudrillard's and Peirce's semiotics, the thesis also responds to the call of Lê and Spee (2015) for importing methodological innovation from new fields and theories to deal with the material in SAP. This thesis also addresses the calls by Cabantous et al. (2018) and Wright (2017) to shift strategy inquiries away from the traditional focus on epistemological inquiries to become ontological explorations of the nature and status of phenomena. By theorizing agency as semiotic and extending it to non-discursive practices beyond the human and re-conceptualizing emergence as rooted in absential constitutive forms, the thesis also responds to the call of Vaara and Whittington (2012) for broadening agency and rethinking emergence in SAP. Finally, the thesis joins the materiality turn in SAP by focusing on the combination of BI and strategizing practices as a genre that significantly structure the activities of managers and other organizational members (Levina & Orlikowski, 2009; Orlikowski & Yates, 1994; Vaara & Whittington, 2012).

1.4 Dissertation structure

The body of this dissertation comprises two parts.

The first part is the introduction and is composed of the following aspects. First, it uses reflection, endogenous reflexivity, and radical reflexivity to lay out the dichotomies of the theoretical assumptions that frame the treatment of BI and its relationship with strategy. Second, it presents the methodological foundation that establishes the philosophical assumptions, the research approach, strategy, choices, and techniques. Third, it summarizes the contributions of the seven essays that comprise the thesis. Fourth, it elaborates on the theoretical implications of the reconceptualization of BI on strategy emergence and the linking of the micro and

macro levels of strategy research. Fifth, it offers practical implications and exposes the limitations of the dissertation, and also pinpoints methodological and research avenues.

The second part of this dissertation is a compilation of the seven essays that form the central tenet of this dissertation. The essays appear at the end of the introductory section in the form that has been accepted for publication. The lead author of each of the seven essays is Yassine Talaoui. I was responsible for writing the body of text, formulating the essay, determining its scope, its positioning, and its contribution. I also took lead responsibility for retrieving, reviewing, coding, analyzing, and interpreting the data and managing the review process (see Table 1).

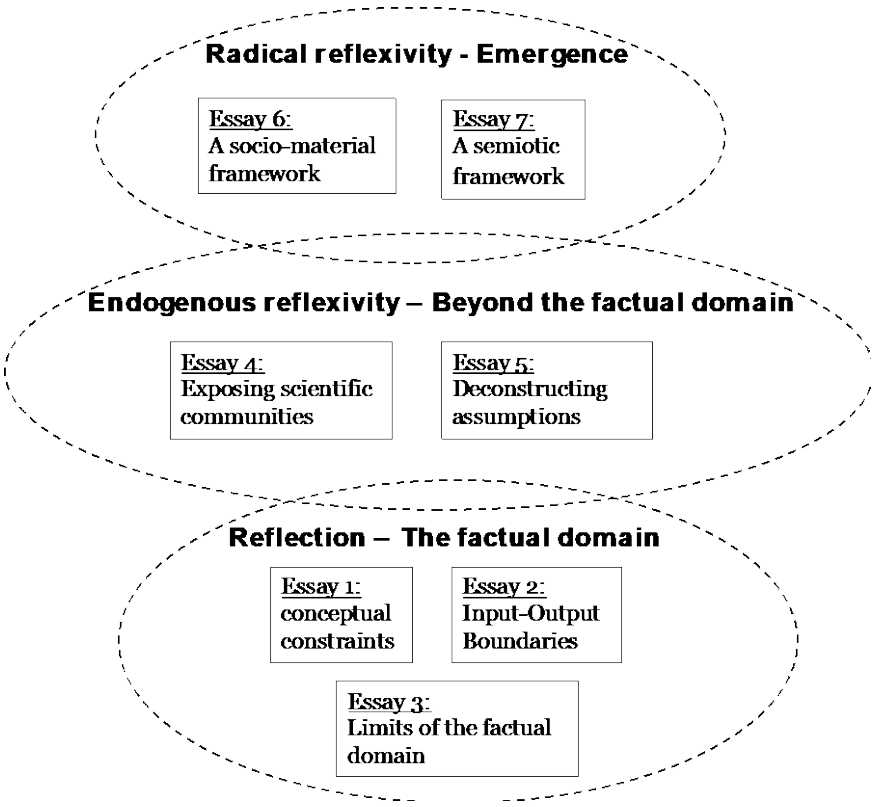

Figure 1. The essays layout

Table 1. Presentation of the seven essays included in this dissertation

Essay	Research focus	Research strategy	Perspective on BI	Outlet	The role of PhD candidate
1	BI conceptual constraints	1st & 2nd whorls of Grounded theory	Equifinality argument	Real-time Strategy & Business Intelligence Palgrave Macmillan	The PhD candidate is the lead author, that is, responsible for setting the scope of the collected data, theoretical sampling, coding, interpreting and analyzing the themes, elaborating the theoretical contribution, and writing the essay
2	BI input-output boundaries	"	Determinist	Management Research Review	"
3	Limits of the treatment of 'the BI–strategy' couplet	"	Humanist	Technology Innovation Management Review	"
4	Mapping the BI scientific community	3rd whorl of grounded theory	Reflexive	Management Research Review	"
5	Deconstructing the taken-for-granted assumptions o n the 'BI–strategy' couplet	"	Post-structuralist	Academy of Management Proceedings	"
6	Addressing the creation and reproduction of the BI–strategy couplet from a sociomaterial lens	4th whorl of grounded theory	Sociomaterial	Practices and Tools for Servitization. Palgrave Macmillan	"
7	Extending our inquiry of the BI–strategy couplet beyond sociomateriality, humanism, and determinism.	"	Semiotic	Academy of Management Proceedings	"

2 THEORETICAL ANCHORING

2.1 BI sustenance of strategy work

The nature of the relationship between BI and strategy reflects the old but worthy debate between determinism and voluntarism of all studies at the intersection of the physical and the social (Arnold, 2003; Barley, 1998). At this intersection, there is a) the dilemma of free will, that is, the nature of causality between the physical and the social, and b) the dilemma between determinism and voluntarism, where the first holds humans as subjects' 'pawns' of a system of forces that condition their behavior, while the latter grants to humans the leading role in their own existence that they model with the choices they make (Barley, 1998).

The notion of BI sustenance is grounded in three views. First, the conceptualization of technology as an influence, free from outside control and tending to change the motion of society (Faraj & Pachidi, 2021; Kelly, 2010). Second, the accounts that downplay the direct causality of technology in favor of social processes (Feenberg, 1999; Winner, 1977). Third, the affordances of technology and how managers can leverage them to convert workflow processes to a largely automatic operation (Braverman, 1974; Edwards, 1979; Noble, 1977; Zuboff, 1988). Below, I delineate the premises of each of these views.

2.1.1 A technological determinist view

The technological determinist framework outlined by Bijker (1995) and Leonardi and Jackson (2004) and others (e.g., Heilbroner, 1967; Marx & Smith, 1994), incorporates a naturalistic logic and notions of deterministic causality into strategy work. It also delimits the capacity of technology to define the nature and form of organizations (Faraj & Pachidi, 2021; Kelly, 2010). That framework is the primary lens on the subject of BI sustenance of strategy work in research rooted in information systems and management and organization studies (Bijker, 1995). That is particularly true of literature drawing on the view of technology advanced by Karl Marx (1955) and Joseph Schumpeter (1942), which has it as a force that can determine and, by extension, threaten the status quo of societies and firms alike (Faraj & Pachidi, 2021). Technological determinism rests upon four assumptions:

- The natural order of the world strongly suggests the progressive advance of technology (Bijker, 1995; Leonardi & Jackson, 2004).
- Any form of social interference disturbs the normal course of nature (Bijker, 1995; Leonardi & Jackson, 2004).
- The intervention of technology into the social realm is one-directional and certain to occur via causality and agency (Heilbroner, 1967; Leonardi & Jackson, 2004; Marx & Smith, 1994).
- The social realm cannot act upon technology whose quality and purpose, following the course of technological advances, can naturally determine and change the socio-cultural order in a way that is certain and inescapable (Heilbroner, 1967; Leonardi & Jackson, 2004; Marx & Smith, 1994).

Here, the technological element is interpreted as an imperative, whether in emergent or fully developed form. It could thus be enlsited to sustain an elusive competitive advantage and ignore how often it is interwoven with the forms of organizing and doing strategy (Faraj & Pachidi, 2021).

2.1.2 A humanist view

Neglecting to inquire about or revising the causality or significance of material technologies beyond its mere existence as a byproduct of the social order–produced by cognitive or symbolic structures that drive human action and interactions (Reckwitz, 2002a, 2002b)—begets a "humanist" view of strategy work (Schatzki, 2001, 2005) prioritizing the conceptualization of these technologies as a setting (Schatzki, 1996; 2001, 2005) or a resource of power (Giddens, 1984). This humanist view is based on the following assumptions:

- A representation bias that assumes that material technologies do not exist prior to human representation and that fails to consider any other form of representation.
- An agency bias that surmises that the human is the driver of social order and material manifestations understood as gateways to the cognitive structures, discursive practices, and interactions of human actors.
- A human/material separatism that strips material technologies of any role in producing social reality and imposes the precedence of the human over the material.

These assumptions work to entrench the view of social practices as normative regularities, asymmetrical across its solid and stable constituents, and conditioned by habits and routines rather than by the social dynamics of the human and the material (Callon & Law, 1997). From this view, only the human aspect is the site of practical understanding, whereas material technologies are restricted to practice, that is, it materializes within it; not outside it (Whitford & Zirpoli, 2014; Reckwitz, 2002a). Accordingly, action is a characteristic of the human (Callon & Law, 1997). Consequently, to explain strategy work necessitates tapping into human variables and attributes rather than the struggles associated with technologies as they undertake strategy work along with the human (Pickering, 2001).

2.1.3 A post-humanist view

An alternative to a humanist account of strategy work is the post-humanist sociomaterial view. That view reinstates the role of material technologies in producing social reality, and imposes uniformity between the human and material technologies as equivalent agents in the coming through of social practices (Schatzki, 2001), and therefore theorizes strategy work as an effect of all arrays of objects and dispositions (Callon & Law, 1997). A burgeoning stream of strategy research is addressing the development of a material turn drawing on sociomateriality. The focus is on the constitutive dynamics between material technologies and the human, and how they create agency and have performative implications for the reconstitution of new practices and outcomes (e.g., Bell & Vachhani, 2019; Leonardi, 2012, 2013; Orlikowski, 2007; Orlikowski, 2010; Orlikowski & Scott, 2014, 2015; Scott & Orlikowski, 2014). As such, sociomaterialistic views are grounded on the following assumptions:

- A rejection of Cartesian ontological separation between representing subjects and things to represent; substituting a performative understanding of the material that shifts attention from linguistic representation to the nature of practices (Barad, 2003, 2007).
- Material technologies are vibrant and impel action and are entangled with the human in an ongoing process of intra-activity (Bennet, 2010).
- The agency of the material is not a matter of linguistic representation of symbols that arbitrarily relate to the material as an object of reference (Rosiek, 2013; Rosiek & Atkinson, 2005; Rosiek, 2018; Kohn, 2013).

- Causality is a matter of intra-actions between practices 'embodied in all configurations that produce the material' and phenomena; the relations of the material produced (Barad, 2003, 2007).

- Performativity is ontological, rooted in agential realism, rather than epistemological (Pickering, 1995) in so far as it does not concern itself with the relationality of the human and the material in producing the social as much as it does with the nature of that production (Barad, 2003, 2007; Haraway, 1991; Butler, 1993).

The determinist, humanist, and post-humanist prisms of BI sustenance of strategy work foster tensions between representation, social production, agency, and action. Therefore, the theoretical challenge for scholars is not solely to pick one of the views, but to suggest an alternative lens that can address the neglected ontological question regarding the nature of BI, and also technology (Faraj & Pachidi, 2021) and its tangled relation to strategy work (Zammuto, Griffith, Majchrzak, Dougherty, & Faraj, 2007). How might that task be achieved? I suggest here that reflection and reflexivity (Pollner, 1991) can provide such an alternative.

2.2 Reflection and reflexivity

Reflection refers to the act of carefully considering an idea or a notion. It offers the possibility of seeing a notion from a fresh perspective facilitated by a new angle of investigation; that fresh perspective would ideally unveil the truth of the notion in reality that extends beyond the boundaries of generally accepted and recognized assumptions and experiences of a particular body of knowledge (Gephart, 1996b; Grandy & Mills, 2004; Pollner, 1991). Existing boundaries have both external and internal edges. Ontology constitutes the outer edge; the phenomenon of the inquiry produces the inner one (Pollner, 1991). Reflection is not concerned with unsettling the ontological suppositions on the boundaries of a concept; rather, it addresses the inner edge by reinterpreting the subject under investigation (Grandy & Mills, 2004; Pollner, 1991). The concept is akin to Woolgar's (1988) benign introspection of the inner story at the self-evident frontiers of a certain phenomenon, which is undertaken to offer alternatives to established reality. Reflection in social science requires a thorough analysis of human conduct to show "the alternative and differential human processes at work in this conduct" (Gephart, 1996b, p. 204). Reflection illuminates new avenues of inquiry, which are then scrutinized with regard to "conceptual and empirical resources" (Gephart, 1996b, p. 204). Furthermore, the practice seeks to reflect "the social and/or natural world," that is, to mirror "a true image of the world" that is established and

compelled by "the outer rim" of traditional theoretical exercise and applications (Pollner, 1991; 376; Gephart, 1996b, p. 204). For instance, one may reflect on BI by conceiving it as the interface between an organization and its external environment and use scientific knowledge of that interface to highlight how uncertainty drastically alters the structure of organizational processes.

Reflexivity, however, differs from reflection in regarding "the basic features of the phenomenon under consideration" as a problem requiring a solution (Gephart, 1996b, p. 204). The concept treats the outer edge (ontological assumptions) with suspicion and regards it as a problem requiring a solution (Gephart, 1996b; Grandy & Mills, 2004; Johnson and Duberley, 2003; Pels, 2000; Pollner, 1991). Reflexivity bifurcates into two ways of problematizing this outer edge as endogenous or radical (Gephart, 1996b; Grandy & Mills, 2004; Pollner, 1991). First, endogenous reflexivity accepts realist ontology and assumes that only human sense-making can explain how social reality comes to being (Grandy & Mills, 2004; Gephart, 1996b). The endogenous reflexivity problematization alludes to the analysis of "how what members do about social reality constitutes that reality" (Pollner, 1991, p. 372; see also Gephart, 1996b, p. 204). It therefore deals with the local formulation of interpretations, narratives, and social order in contexts where the meaning of those contexts is determined by the narratives produced. The same holds for those narratives whose sense depends on the settings in which they originate (Leiter, 1980, p. 139; Gephart, 1996b, p. 204). Endogenous reflexivity, therefore, attends to "the self-generating properties of settings and phenomena, the mutual elaboration of settings and accounts" (Gephart, 1996b, p. 205; Leiter, 1980; Mehan & Wood, 1975). For instance, one might look into the literature of a scientific community by analyzing their philosophical and theoretical assumptions, generating written accounts of their narratives, and then inspecting in detail how their contributions simultaneously constitute the context of the phenomenon they tackle (Gephart, 1996b).

The second manifestation of reflexivity is radical reflexivity. A researcher who is "self-referentially aware" that reflection does not happen in a vacuum but within an indiscernible and implicit domain of assumptions occurring prior to both the reflective process and the subject matter of the reflection might pursue radical reflexivity (Gephart, 1996b, p. 205; Pollner, 1991, p. 376). What radical reflexivity does then is to recover the tacit assumptions that give rise to the frame where both reflection and endogenous reflexivity can take place (Gephart, 1996b). It disputes the 'truth' of the accepted social reality by challenging the core and equivalent forms that produce the established domain of this reality (Pollner, 1991; Grandy & Mills, 2004). Radical reflexivity, therefore, is an "abnormal discourse" (Pollner, 1991, p. 376; Rorty, 1979, p. 320) that plays havoc with "normal inquiry" and

"ordinary discourse," disturbs reality, and challenges the foundational properties of discourse upon which "the sensibility of the discourse presumably rests" (Gephart, 1996b, p. 205). It takes up the process of remaking the natural (Pollner, 1991, p. 377) and involves a recognition of the established and distinctive attributes of "human meanings and actions" (Pollner, 1991, p. 370; Gephart, 1996b, p. 205). However, this alternative, what Rorty describes as "abnormal discourse" (1979, p. 320), seeks to provide a necessary framework that unsettles these taken-for-granted assumptions, rather than becoming a substitute that might supplant it (Pollner, 1991; Grandy & Mills, 2004). Disrupting the established boundaries of a certain subject of inquiry is the merit whereby radical reflexivity creates and sustains opposing versions of truth, a process that opens the door for other inquiry options (Grandy & Mils, 2004; Pollner, 1991). As a corollary, radical reflexivity enlarges the scope of inquiry toward territories beyond the settled ones of established theories to produce new understanding of the foundations and assumptions of our knowledge (Gephart, 1996b, p. 205).

2.3 Reflection in the literature on the BI-strategy couplet

Technological determinism (Bijker, 1995; Heilbroner, 1967; Leonardi & Jackson, 2004; Marx & Smith, 1994) is the primary lens on the subject of BI sustenance of strategy work. It is necessary to integrate technological disruptions into logical, structural, and positivist models and strategy tools (e.g., the strategy map, the balanced scorecard, Porter's five forces) to accommodate the premises of technological determinism. Technological determinism hence attempts to create an input-output model for strategy work, which isolates the technological or analytical facet of strategizing from the social dynamics that enact the strategizing activities. I argue that this input-output model has been treated reflectively rather than reflexively.

The input-output domain treats BI as a technology with a crucial role in forming organizational structure (Lawrence & Lorsch, 1967; Thompson, 1967; Woodward, 1965), determining how inputs turn into outputs (Perrow, 1984), and reporting workflows (Scott & Davis, 2007). Business intelligence must be preserved, upgraded, and improved to ensure the continuity of its value (Faraj & Pachidi, 2021). For instance, this contingent view posits that the BI technology that organizations possess differentiates their structures, and therefore they must safeguard it against the adverse effects of the environment (Woodward, 1965; Faraj & Pachidi, 2021; Thompson, 1967). Accepting the contingent view leads designers to deal with BI in a way that promotes its information processing component, which in turn shifts the focus toward carefully designing complex and

logical architectures that shield the information processing capacity (Faraj & Pachidi, 2021). Second, rising uncertainty in the business environment causes attention to turn to how to make the information processed and produced correspond in some essential respect to the needs of competitive dynamics (Faraj & Pachidi, 2021; Galbraith, 1973; Nadler & Tushman, 1988).

As a means of establishing the input-output model of strategy work, technological determinism deploys existing theoretical frameworks of the content school of strategy rooted in the structure-conduct-performance (S-C-P) paradigm. For instance, the input-output model pays particular attention to environmental uncertainty, which does not approach uncertainty as an antecedent to strategy work but as the core issue of strategy. The use of technological determinism thus serves to enclose the new input-output model within the outer edge of traditional "scientific theories and practices" (Gephart, 1996b, p. 206). In fact, technological determinism takes up a "mirror perspective" of BI and environment in which BI is assumed to reflect a "factual world" (Gephart, 1996b, p. 207; Rorty, 1979). By arguing the need to move environmental uncertainty from the periphery to the center of theorizing, technological determinism adopts an information-oriented view. That view entails treating BI as a processing capability that is salient to organizational structures because it affects the information flow across the organization in three ways: 1) it influences the organization's demand for information processing, 2) it controls the organization's capacity for processing information, and 3) it permits organizational stakeholders to gather, and then slice and dice raw data quickly and transfer more factual results across organizational strata (Burton, Obel, & DeSanctis, 2011, p. 6; Faraj & Pachidi, 2021).

Technological determinism therefore elicits a conservative view (Jameson, 1991, p. xviii) of present and future organizations as "post-industrial" (Shrivastava, 1995, p. 119) rather than "postmodernist" societies (Gephart, 1996b, p. 207). It excludes social processes from acting upon BI and invokes a one-directional argument that considers technology the only decisive factor in the outcome of organizational structures (Baldwin, 2019) and the socio-cultural order (Heilbroner, 1967; Leonardi & Jackson, 2004; Marx & Smith, 1994). As such, the one-directional argument of technological determinism stands at the heart of the debate about *structure-technology* in confrontation with the *equifinality* argument (Baldwin, 2019). While that debate acknowledges the influence of technology on all aspects of structure, it also asserts that "the technology-structure need not imply a single determinant relation" (Scott, 1990, p. 121; Faraj & Pachidi, 2021, p. 4).

Building on the equifinality argument, scholars—particularly those from the field of innovation—conceptualize BI as paramount to competitive advantage.

Therefore, they focus on how to incrementally innovate organizational routines to keep pace with BI's rapidly changing character and avoid a state of inertia that would require a radical alteration of the ingrained culture and routines (Anderson & Tushman, 1990; Faraj & Pachidi, 2021; Schilling, 2017; Tushman & Nelson, 1990; Tripsas, 1997). Accordingly, these streams divert the attention of scholars from exploring the relationship between BI and strategizing and understanding the underpinnings of this mutual influence. Instead, scholars scrutinize the factors impacting the technological advancements brought by BI and how organizations can harness constant technological innovation to integrate their routines both to deliver sustainable competitive advantage and fully exploit BI to reposition themselves in the competitive environment (Ahuja, Lampert, & Tandon, 2008; Faraji & Pachidi, 2021). In sum, the way that BI relates to structure is discontinued in favor of a race against time to derive better performance and value from its technological innovation (Faraji & Pachidi, 2021). However, rejecting or endorsing technological determinism hinders taking BI seriously and restricts the theoretical challenge. That challenge reappears whenever the firm's technological progress accelerates and has two poles: Either BI exerts an inexorable influence on organizations, or it holds "clay" features that allow organizational actors to model and shape it as they see fit (Bodrožić & Adler, 2018; Davis, 2016; Faraji & Pachidi, 2021; Orlikowski, 1992).

In one respect endorsing technological determinism highlights the following limitations. First, the importance of BI as a determinant of structure dwindles when confronted with studies that view organizational size and hierarchy as the only decisive factors in shaping structure (Donaldson, 2001). Such a perspective necessarily replaced theoretical progress emphasizing BI—"which had virtually died out as a theme in the study of organizational form and function within the organization science literature" (Zammuto et al., 2007, p. 750)—with theorizing that emphasizes subjects such as "power, institutions, human relations or transaction costs" (Faraji & Pachidi, 2021, p. 5).

Second, there is a complication with containing BI as part of existing theory arising from it being a construct conceptualized in different ways, which tends to relegate it to the background as something akin to a prop (Faraji & Pachidi, 2021). For example, when Williamson (1988, p. 375), the father of transaction cost economics, was asked about the place of technology in his theory, he responded: "technology thus serves to delimit the feasible set, choice within which mainly reflects transaction cost economizing purposes." Similarly, institutional theorists pay more attention to new institutional (re)orderings that are key for successful digital transformations and investigate how these (re)orderings cultivate social acceptance (Hinings, Gegenhuber, & Greenwood, 2018). Scholars drawing on

agency theory, institutional theory, contingency theory, and resource dependency theory find it hard to deal with "the constitutive entanglement" of BI and strategizing for their focus is toward their epistemological standards whereby they infer to the "loveliest explanation, and so orient themselves to the explanation that provides theoretical elegance, confirmation of previous frames, or unified understanding", and frequently reject "the likeliest explanation for it may appear to be more trivial, direct, and less aligned with paradigmatic assumptions" and therefore "no matter how fast [BI and its analytical technologies] are transforming society and organization, [they] do not rise to the level of theoretical loveliness" (Faraji & Pachidi, 2021, p. 5; Lipton, 2004).

Nevertheless, rejecting technological determinism leads scholars to fall prey to the very same assumptions they dismiss as inappropriate. First, establishing the belief that BI is not what shapes structure denies it all agency and portrays it as a malleable artifact formed by the choices of managers (Faraji & Pachidi, 2021). That despite the abundant evidence of the capacity of technology to influence the social realm at the macro level and assist the social dynamics at the micro level (Misa, 1994). Second, a rejection of technological determinism instills a reluctance to value BI because of its blurry ontological and epistemological position. That leads to questions around whether the focus should be on BI per se, or on BI systems, and whether to engage with BI at "the organizational, departmental or task level" (Faraji & Pachidi, 2021, p. 5; Goodman & Sproull, 1990). Third, when scholars reject the influence of BI on structure, they still have to decide how to go about approaching the concept of BI. They might approach the concept as a structure to be "reciprocally engaged" with, given its ability to shape "interaction patterns" (Barley, 1986; Orlikowski, 1992), or as something with the effect of a "pun", capable of having more than one meaning, thus establishing entrenched "interaction patterns" or unsettling them (Weick, 1990, p. 19; Faraji & Pachidi, 2021, p. 5).

Finally, the positivist epistemology of technological determinism embraces the pendulum movement between the one-directionality and equifinality arguments. It also fails to add a new variable to strategy, management, and organization theory—the ontological status of BI, and by extension, technology. Therefore, this state of affairs sheds light on the silences about BI in the modernist strategy, management, and organization research by settling for social constructionism as a prism that resonates well with modernist "theoretical preferences" (Faraj & Pachidi 2021, p. 6) and thus pictures BI as an element that can influence strategy and organization (Boudreau & Robey, 2005), and at the same time as subject to "managerial choice" that models its usage to improve operational excellence and create and capture value (Daft, 2009, p.20). Such a perspective neglects to "open

up space for new theories or postmodern alternatives to positivism" (Gephart, 1996b, p.207).

2.4 Endogenous reflexivity

Endogenous reflexivity (Pollner, 1991; Gephart, 1996b) offers a theoretical framework to access the concepts of BI. It encourages researchers to view the BI concept as a "sense-making resource or [as] interpretive schemes" that emanates from our discourses, textual renderings, and social and customary habits of performing an activity or the scientific writing of strategy and technology scholars (Gephart, 1996b, p.208; Gephart, 1993). The purpose for which endogenous reflexivity rests on realism as an ontology that supposes that our world is real and we can only recognize it and know it through means of "interpretation and sense-making" (Gephart, 1996b, p. 208). Accordingly, our interpretations of that world vary according to our viewpoints and cultural stands. Therefore we, as social actors in our world, interpret it "differentially".

In contrast, a positivist or objectivist ontology deems any differential interpretation a result of certain flaws in our interpretative process (Berger & Luckmann, 1966;1967; Gephart, 1984; Gephart, 1996b, p. 208). Endogenous reflexivity hence re-establishes BI and ceases to treat it as a single coherent entity, which enables scholars to explore the social instances and settings where BI and its associated notions and phenomena are present as themes in discourses and narratives of social actors (Gephart, 1996b). On the grounds of ethnomethodology—which investigates how members of a community use daily conversations to build a shared view of the world—neither BI nor the firm exists in and of itself, but, rather, because of sense-making practices that bind it to the organization and generates knowledge about both entities (Gephart, 1984).

This perspective indicates BI is a socially constructed reality created through sense-making (Gephart, 1984). Advocates of the perspective can therefore abandon the quest for "true reality" and substitute an exploration of the "practices" that support BI and its realities (Gephart, 1996b, p. 209). Considering that the intentions, curiosity, attention, and comprehension of social actors are not the same, distinct descriptions of BI will materialize (Molotch & Lester, 1975; Gephart, 1996b). BI sense-making is hence essentially political as it requires those descriptions to serve as foundations for action in settings marked by contentious and differing descriptions (Gephart, 1996b). Disruptions to BI and how to attend to them can hence be addressed by referring to discourses and textual descriptions enacted in situ which illustrate disparate opinions of BI and social reality to

legitimize the "interests and actions" of social actors (Gephart, 1996b, p. 209). At the core of the application of endogenous reflexivity is the situational exploration of the senses and usage of BI, that is, examining the management of senses ascribed to BI in settings where its related issues emerge as matters of interest (Gephart, 1988b; Gephart, 1996b). These matters reflexively begin to be constitutive of the social and organizational production of BI (Gephart, 1996b, p. 209).

Endogenous reflexivity has previously been adopted to investigate the discipline and practice of strategy (e.g., Grandy & Mills, 2004), to explore the textually generated meaning of environmental crises (Gephart; 1984, 1988a; 1993), and to examine the situational production of discourse at public hearings (Rifkin, 1994). The fourth and fifth essays of this dissertation employ endogenous reflexivity to showcase the significance and consequences of "sense making and interpretation" (Gephart, 1996b, p. 209) in problematizing the term BI, based on academic publications. The essays show that BI scientific communities hold different opinions of BI and its implications, which they utilize to justify their theorizing and research agendas.

The factual assertions of both communities are thus problematized through endogenous reflexivity (Gephart, 1996b). Both groups' narratives reflexively portray BI's status as relatively mutually exclusive, either as an inevitable causality or social artifact. The dichotomy limits the possibility of complementarity that the two lenses could shed on BI's functionalities and affordances (Orlikowski & Barley, 2001). Endogenous reflexivity critically analyzes the constitutive properties of these narratives and the other alternative narratives that emerge from other fields, in particular the ones drawing from cultural theories. These alternative narratives claim that BI submits to the human agency of its designers, engineers, and programmers based on their perspectives on the laws of physics and assumptions relating to how BI is intended to be used and its consequences (Bucciarelli, 1994). The agency of those who use it and enact its various affordances as they embed it in their social systems and practices, shape the BI's intended usage and outcomes, and yield unintended social settings (Barley, 1986; Orlikowski, 2000; Orlikowski & Barley, 2001). The malleability of the properties and functionalities of BI render it subject to the influence of human agency, and yet these very same material attributes can resist human alteration, and therefore its rigid design or functionality exerts constraints and influence over human agency (Norman, 1999; Orlikowski & Barley, 2001). These narratives are reflexive in the sense that they justify and conceive the critical claims of sociomaterialists. Unearthing the disparate narratives problematizes each set of narratives because each yields "alternative truths" (Gephart, 1996bb, p. 210) about BI. Endogenous reflexivity

offers a practical exhibition and explanation of the diverse realities emerging from these divergent descriptions and interpretations, and demonstrates how the narratives of the scholarly communities generate the realities they encounter (Gephart, 1996b).

Endogenous reflexivity curtails the treatment of BI as comprising recognizable "facts of the world" and therefore reveals the sense-making and interpretive practices that mark BI and strategizing as "in situ contingent" actions of certain communities and players (Gephart, 1996b, p. 210). Consequently, endogenous reflexivity sets up a sine qua non for elaborating differential explanations of BI congruent with privileging BI matters in strategy research. Endogenous reflexivity converts BI from the "factual domain of the natural world" into "a socially constructed feature of society" (Gephart, 1996b, p. 211). It allows the researcher to investigate BI as a first-order construct upon which to establish second-order concepts that include actors "first-order concepts and meanings" (Gephart, 1996b, p. 211; Schutz, 1962). Put differently, endogenous reflexivity allows a) conceptualizing BI based on society and real human discourse, and b) analyzing particular settings where textual renderings and factual discourse about it happen, and c) grounding the theorizing on data gathered from these settings, which subsume "the meanings and interpretations of actors themselves" (Gephart, 1996b, p. 211). Furthermore, endogenous reflexivity is carried by methods that attend to the examination of bodies of text like textual analysis (Gephart, 1993), deconstruction (Derrida, 1991; 1997), narrative analysis (Gabriel 2000, Greimas 1987), or discourse analysis (Fairclough, 1985; 1993), and conversational analysis (Heritage, 1984). By and large, endogenous reflexivity can be deployed to show how the actions of a community of scholars and sense-making yield the properties of BI as a feature of the social world. Those properties can demonstrate how realistic other narratives and discourses are and, therefore, can de-reify narratives that would otherwise be taken for granted and accepted as truth (Gephart, 1996b, p. 211).

Importing endogenous reflexivity to investigate the research on BI challenges its positivist ontology and technological determinism by necessitating realism as ontology that is fundamentally divergent from positivism (Gephart, 1996b). Endogenous reflexivity de-reifies BI and blocks any implicit credence of its technological aspects being truth resistant to the dynamics of social construction (Gephart, 1996b). In fact, endogenous reflexivity infringes taken-for-granted positivist assumptions about BI, and as a corollary regards the claims of scholarly communities as a problem requiring further exploration and alternative accounts, if they are tobe fully integrated into strategy research (Gephart, 1996b). By so doing, endogenous reflexivity increases uncertainty about the salient aspects of BI;

the significance of these aspects is itself socially constructed via the practices of interpretation and the sense-making of social actors (Gephart, 1996b). Ultimately, there remains no objective position that the researcher can take to impartially discern revealing facts (Gephart, 1996b). Even conceptualizing BI as being composed of certain variables or developing a plain set of technology and analytics variables—to be handled in terms of causality and implications to attend to technological disruption issues—is itself treated as a problem, whereas "human meanings" are pictured as constitutive of BI, and not only as artifacts that come into view from passive experiences with the objective BI (Gephart, 1996b, p. 211-212).

2.5 Radical reflexivity

Radical reflexivity (Pollner, 1991; Grandy & Mills, 2004) attempts to examine and extend the boundaries of reflection and endogenous reflexivity to identify the boundaries of human knowledge as a whole (Gephart, 1996b). It problematizes the fundamental assumptions underpinning perspectives of a particular conception of the world and even the likelihood of conceptions of the world as human method by which a worldview is brought about (Gephart, 1996b). Here, I discuss Baudrillard's (1983, 1994) simulation and simulacra as the bases of radical reflexivity and show how their use in scholarly texts on BI "unsettles the outer rim" of the factual accounts found in literature on BI (Gephart, 1996b, p. 212; Grandy & Mills, 2004, p. 1159).

Simulacra materialize from simulation (Gephart, 1996b), that is, "the generation of models of a real without origin or reality" (Baudrillard, 1983, p. 2). The Merriam Webster dictionary defines simulation as "the act of simulating," that is, to give or assume the appearance or effect of that which one is not or does not possess. It passes along the stages of the image and encloses the whole structure of representation (Gephart, 1996b). In the first stage of the image, representations are mere reflections, that is, the production of an image as if by a mirror (Gephart, 1996b). In the second stage, the reality is concealed or altered in representation from its original course, meaning, or state (Gephart, 1996b). In the third stage, the image emerges to signal "the absence of any reality" (Gephardt, 1996b, p. 212). In the last stage, the image bears neither resemblance nor relation to reality (Baudrillard, 1983, p. 11), and therefore becomes "fully simulacral," that is, the quality of a sign that erodes "the reality principle" (Baudrillard, 1983, p. 43).

Simulation happens in settings where "the model precedes reality", and as such facts do not follow an independent course, that is, they emerge only at the junction

of models (Baudrillard, 1983, p. 32; Gephart, 1996b, p. 212). Therefore, illusion is impossible for the real is no longer viable (Gephart, 1996b, p. 212). Simulation is inherent to science, which progressively implements models to forgo its object; eventually models replace their objects completely (Baudrillard, 19843, p. 14; Gephart, 1996b, p. 212). The simulacrum is the entity that emerges through the simulation process (Gephart, 1996b) that is "the truth which conceals that there is none" (Baudrillard, 1983, p. 1). Science is contingent upon simulation for the ontology of science considers "only that which is reproducible" as real (Baudrillard, 1983, p. 146), and as a consequence a real entity, on the grounds of science, is not genuine, but, rather, only the items that can and have been representations of originals (Gephart, 1996b). The copy hence supersedes and replaces reality, and science is concerned only with the copy "the simulated, the displaced, the reproduced" that is "the simulacral" (Gephart, 1996b, p. 213).

Three orders of simulacra exist (Baudrillard, 1994;1983; Gephart, 1996b; Grandy & Mills, 2004; Genosko, 1994). The first order is the "natural simulacra," which reproduces images based on reality while a difference between the fake and reality is kept (Baudrillard, 1994, p. 121; Gephart, 1996b, p. 213). The second order is "the products" that are representations and copies that relinquish any difference with the real, in that they assimilate semblances and dissolve the real. As such the first-order "counterfeit" is therefore renounced in favor of the "re-production" (Baudrillard, 1983, p. 83-95) that effaces "the original" by subsuming and dislodging it (Gephart, 1996b). Simulation models are third-order simulacra, that is, entities completely within a simulation, such that each link, opposition, and inconsistency between real and imaginary is removed in the sense that there is no imaginary left and that the real turns into the hyperreal "that which is already produced" (Baudrillard, 1983, p. 83-147; Gephart, 1996b, p. 213).

The passage from one order to the next shows an inclination toward reassimilation of the break between the real and the imaginary, the break within which is situated "ideal or critical projection" (Gephart, 1996b, p. 213). Projection is "implosively reabsorbed" within third-order simulacra, which leaves room for neither fiction nor reality (Baudrillard, 1994, 122-125; Gephart, 1996b, p. 213). Third-order simulacra represent the flow of the model in as much as they do not go beyond the real but "displace it, colonize it, and thereby anticipate the real" (Baudrillard, 1994, p. 122; Gephart, 1996b, p. 213). It is then no longer possible to "isolate the process of the real, or to prove the real" (Baudrillard, 1983, p. 41).

2.6 The simulacral BI

One can avail themselves with the notions of simulation and simulacra to construct a radically reflexive discourse on BI that unsettles the conventional and scientific discourse that conceives BI as a "real" element of the world (Gephart, 1996b, p. 213). The notions of simulation and simulacra prompt examining "the origin, maintenance, and reproduction of the real, and contextualizing the scientific observer and ourselves within the framework of simulated environments" (Pollner, 1991, p. 377; Gephart, 1996b, p. 213). Below, I outline the application of simulation and simulacra as notions to assist in rethinking and re-theorizing BI on the grounds of radical reflexivity. The aim is to explore the prospects of re-conceptualizing BI as part of a future research agenda that enlarges the scope of the material turn and technology sustenance in strategy research and science and technology studies.

2.6.1 A Computational sustenance

The dominant view of BI in the literature, which is rooted in technological determinism, transforms it into computational sustenance that, through its algorithmic and mathematical capabilities, can mirror and monitor the organizational phenomena (Orlikowski & Iacono, 2001; Kling, 1987). The computational sustenance concept embraces the quality of technological components of BI as determinants of the socio-cultural order, which in turn changes following the course of technological development (Heilbroner, 1967; Leonardi & Jackson, 2004; Marx & Smith, 1994).

The computational sustenance concept is a first-order "counterfeit image" of BI, that is, an "an imperfect representation" (Baudrillard, 1994; Gephart, 1996b, p. 214). A concept such as representation diverges from the actual BI encounter with the doings of strategy that involves human interactions and social dynamics. Accordingly, the computational sustenance is a first-level simulacrum that is an image based on data that BI communicates as a representation of organizational phenomena where a difference with organizational reality is kept (Gephart, 1996b). This simulacrum 'computational sustenance' emerges as a sign representing the competitive and organizational environments (Baudrillard, 1983, p. 87-88). The computational sustenance concept represents BI as an aggregation of analytical technologies constituted by algorithms, machine learning techniques, and data storage and mining systems represented in mathematical, statistical, and graphical terms. Similarly, strategy tools and frameworks—for instance, a set of solutions to real-world problems (Grandy & Mills, 2004)— are "first-order images

and simulacra, that is, partial representations or imitations" (Gephart, 1996b, p. 214) of the organizational and competitive world.

Mathematical models and algorithms of computational sustenance are representations of the competitive and organizational environment and therefore constitute a second-level image, for instance, models of prediction and dissemination of intelligence across organizational units or transforming organizational culture to better accommodate the analytical requirements of the computational sustenance concept. Therefore, models of the computational sustenance make reality simpler and conceal or distort it as they comprise only a restricted amount of likely aspects of it. Put differently, there is an inclination to consider these computational sustenance models and algorithms as embodying "true descriptions" (Gephart, 1996b, p. 214) of the real "social, economic, and informational phenomena, e.g., processes, structures, events, knowledge, etc" (Orlikowski & Iacono, 2001, p. 127), and in this case, mathematical mechanisms and programming techniques of data modeling or simulation of the competitive and organizational phenomena turn into constituents of the computational sustenance concept.

These data models or simulation of the computational sustenance concept produced through mathematical and machine reasoning (Orlikowski & Iacono, 2001, p. 127; Agre, 1997) are therefore "second-order scientific simulacra" (Gephart, 1996b, p. 214). That is because computational sustenance as a discernable scientific subject is determined by mathematical techniques and design methods as a foundation of its objective reality (Gephart, 1996b). This appears in the conceptual nomenclature of computational sustenance that signifies the "computational power [and capability] to represent, manipulate, store, retrieve, and transmit information, thereby supporting, processing, modeling, or simulating aspects of the world " (Orlikowski & Iacono, 2001, p. 127). Computational sustenance as such is therefore perceptible only via proof of this "computational power," which is only perceptible via algorithms, codes, and mathematical techniques.

The computational sustenance's attributes or discernable components in the real BI—now "reconstituted scientifically" (Gephart, 1996b, p. 215) as computational sustenance—are perceptible attributes of organizational data representation power and capability only when and if mathematical and algorithmic mechanisms can be deployed to identify, assess, and develop those components. Mathematical models and algorithms signify, are grounded on, and represent "reproducible phenomena" (Gephart, 1996b, p. 215). Real BI no longer exists as it fades away for computational sustenance to supplant it. Likewise, in strategy research, strategy

tools or frameworks have a propensity of to arise as the foundation of strategy research into depicting the variables competitive and organizational environment, and also as a premise for strategy decision-making and planning. Such representations alter or twist the competitive and organizational environment "by simplification, demarcating specific sectors, which thereby substitutes a false image [the tool or the framework] for some real or more direct representation" (Gephart, 1996b, p. 215) of these environments.

The third- and fourth-order of images signal the "absence of reality" since the simulacrum carries no correspondence to reality, for it is rooted in "models of simulation" (Gephart, 1996b, p. 215). Treating mathematical models and algorithms as concrete organizational phenomena happens in the technological determinist-based literature where the organizational phenomena and processes are replaced with mathematical simulation of these phenomena and processes. It is thus assumed that organizational phenomena and processes are constructed with reference to "mathematically [and algorithmically] representable phenomena" (Gephart, 1996b, p. 215); thus, mathematical and algorithmic mechanisms are what feed into the craft of "research programming" or utilizing BI as "language machines" (Orlikowski & Iacono, 2001, p. 127; Agre, 1997) where mathematics and algorithms form the language of organizational phenomena.

Therefore, the reality of BI is established through algorithms and mathematical modeling such that its reality exists only in scientific theorizing and empirical procedures, as knowledge that can be copied and reproduced, and that reality is endogenous. Therefore, it originates in the computational and algorithmic mechanisms and is not analogous to the real competitive and organizational environments external to the 'computational power' (Trice & Davis, 1993; Orlikowski & Iacono, 2001). Mathematical models and simulation oust BI as "the object of scientific inquiry as the point where inquiry begins, and as the culmination or goal of inquiry" (Gephart, 1996b, p. 216). BI sustenance, as a model of organizational phenomena thus proves to be simulacral.

2.6.2 An Object of reference vs. a protean agent

The humanist and post-humanist treatments of BI stand at two opposing poles of the relationship between the human and the material. The humanist embraces the Cartesian dualism between a knower and an object to know, while the post-humanist rejects the 'material/human' distinction, viewing them as entangled.

As such, the humanist treatment of BI advances the simulacrization of BI as an object of reference that does not exist of itself but as an object we know, interpret,

or talk about (Reckwitz, 2002b). Therefore, the object of reference is a first-order simulacra, for it is a counterfeit image through which BI can be viewed (Grandy & Mills, 2004). The object of reference concept shifts the attention toward the human and their symbolic orders (mind, discourse, communication) that give BI its symbolic quality and make it visible (Reckwitz, 2002b; Schatzki, 2001, 2005). This view supplants BI with the human symbolic orders that refer to it. Therefore the human symbolic order is a second-order simulacra that makes reality simpler to understand. It advances the idea that BI can be understood by humans through their mental or linguistic representations. The conceptualization thus displaces the object of reference 'first-order simulacra' (Grandy & Mills, 2004).

Accordingly, the object of reference concept gains its symbolic quality at the level of cognitive (conscious/unconscious) structures that reside in the mind (Reckwitz, 2002b) and influence what can exist as an object of reference (e.g., Jarratt & Stiles, 2010; Jarzabkowski, Giulietti, Oliveira, & Amoo, 2013; Thomas & Ambrosini, 2015; Wright, Paroutis, & Blettner, 2013). Similarly, symbolic orders outside the mind in extra-cognitive symbolic structures (discursive or textual) can also refer to BI and therefore produce it (e.g., Arnaud, Mills, Legrand, & Maton, 2016; Buergi, Jacobs, & Roos, 2005; Cornelissen, Mantere, & Vaara, 2014; Hardy & Thomas, 2015; Heracleous & Jacobs, 2008b, 2008a; Stigliani & Ravasi, 2012). Finally, symbolic orders in language-based social interactions (Reckwitz, 2002a, 2002b) can interpret BI and constitute it in interactions to give it meaning (e.g., Bechky, 2003; Carlile, 2002; Carlile, 2015; Cooren, 2004; Kornberger & Clegg, 2011; Schoeneborn, 2013; Spee & Jarzabkowski, 2009; Vaara, Sorsa, & Pälli, 2010).

As such, the object of reference is a concept that gives the human primacy in handling BI and thus in enacting BI's affordances to supplement the doings of strategy (Reckwitz, 2002b; Schatzki, 2001, 2005). Thus, BI is objectified as a supplement to the social practice of strategizing, not a cause or a condition to its emergence (Derrida, 1967;Reckwitz, 2002). Therefore, the systems of meaning (mind, discourse, communication) give BI its symbolic quality and make it visible (Reckwitz, 2002b). This symbolic quality is thus the third-level simulacra that "bears no resemblance to reality" (Grandy & Mills, 2004, p. 1163) because symbolic quality is a model of simulation where BI becomes a matter of simulation (Baudrillard, 1983). It therefore "displaces it, colonizes it, and thereby anticipate(s)" the real BI (Baudrillard, 1994, 122; Gephart, 1996b, p. 213) and therefore it is no longer possible to "isolate the process" of BI or to prove it (Baudrillard, 1983, p. 41).

In contrast, the post-humanist treatment of BI, assumes the simulacrization of BI as a protean agent. This concept is thus a first-order simulacra because it is an imperfect representation that deprives the human of intentionality and "reconstitute(s) the ideal" (Grandy & Mills, 2004, p. 1161; see also Baudrillard, 1991) by confering agency on BI (Latour, 1993; 2004b). Contrary to the humanist view, their thesis ousts mental and linguistic representation from the way we think about BI and condition its status as a passive object (Barad, 2003, 2007; Lemke, 2015;). Instead, BI is conceived as resistant to our modes of representation that bind its meaning to its role within the human context (Bennet, 2010; Barad, 2003; Crossland, 2017; Harman, 2002; Latour, 2004 a). BI thus carries its meaning within its materiality and refutes our biased unitary view of it as a passive thing that awaits our cognitive or symbolic representation to reveal its being (Barad, 2007; Bennett, 2010; Rosiek, 2018). Materiality is therefore a second-order simulacra that is a copy replacing the counterfeit 'protean agent' (Baudrillard, 1983, 1991; Gephart, 1996b), in the sense that what this materiality affords replaces the first-order simulacra.

The protean agent concept depicts BI as something obdurate and in defiance of our interpretative frameworks (Rosiek, 2018) while also being constitutive of strategizing practices in the same way as humans. As such, this concept depicts BI as vibrant and impulsive in seeking action and something that we discover as we inquire about it (Barad, 2007; Rosiek, 2018). Therefore it is the entanglement between BI and the human in ongoing intra-activity that causes the emergence of the social context of strategizing. As a result, the entanglement is a third-order-simulacra. It is a "simulation simulacra" or simulations models through which "third-order simulacra are the circulation of the model; they no longer transcend the real" (Gephart, 1996b, p. 213;Grandy & Mills, 2004, p. 1161). The aim of the third-order simulacra is complete authority that is "hyperreality" (Baudrillard, 1991), and thus once the entanglement 'third-order simulacra' is fulfilled, it becomes infeasible to produce BI from the unreal (i.e., the entanglement of BI and the human) because the process would require us to locate the "decentered occurrences, models of simulation" of that entanglement, and then grant it the meaning of the real BI, which entails reinventing the real BI as "fiction, precisely because it has disappeared" (Baudrillard, 1991, p. 311; Grandy & Mills, 2004, p. 1161).

2.7 The BI–strategy encounter

The notion of technology as a line of inquiry has been salient to management and organization studies (MOS) and is believed to shape the content and format of

organizing, managing, and strategizing activities (Bailey, 2019; Galbraith 1973; Perrow 1967; Thompson 1967). However, research placing BI in the foreground of organization processes is scarce (Zammuto et al., 2007; Orlikowski and Scott 2008; Leonardi and Barley, 2010). That is because researchers and practitioners alike focus on improving organizing activities and automating existing processes to circumvent technological disruption. The process produces theories centered around understanding what happens and how to safeguard organizing and work processes once new technologies have made their way into the firm (Bailey, 2019).

Nevertheless, new technologies such as BI are intelligent, meaning they carry a greater disruption risk. That risk extends beyond automating and feeding existing processes with data and arises due to their ability to be autonomous, learn, and operate in ways that increasingly seem intentional and able to replicate, if not exceed, human cognition (Bailey, 2019). Consequently, BI challenges its conceptualization frameworks and prompts scholars to take its status seriously, and rethink the taken-for-granted assumptions about its role in the doings of strategizing, and also its relationship with the human and the social (Bailey, 2019; von Krogh, 2018). Accordingly, scholars have called for new perspectives such as a sociometrical lens (Barley and Leonardi 2010; Kuhn et al., 2017; Orlikowski and Scott 2014;) that involves theorizing beyond the functionalities and usage of BI that permeates contemporary research (Brynjolfsson and McAfee 2014; Ford 2015; Kaplan 2015). The way the research depicts the role of BI in strategy emphasizes its technological analytics at times and at others give prominence to the organization as the vehicle of strategizing. Both depictions at times take BI for granted as a flexible artifact that can be carved in organizational processes to accompany strategy implementation (Baptista et al., 2021; Orlikowski, 1992; Markus and Robey, 1988; Beynon-Davies, 2011; Beynon-Davies et al., 2009).

Studies indicate that it is the interplay, coupling, or entanglement between the organizational social milieu and BI as a technology that triggers social and technological processes to meet intended strategic goals (Baptista, 2009). If the intended affordances of BI diverge from the expectations of strategy actors conflicts erupt. Conflict triggers the adjustment of routines (Berente & Yoo, 2012; Baptista et al., 2021; Hultin and Mähring, 2014) and eventually gives BI meaning at the micro-level. The practices and activities of BI are then likely to be attuned to accommodate strategic intent (Baptista et al., 2021) and align the usage of BI technologies with strategic objectives (Karpovsky and Galliers, 2015). Accordingly, strategic intent becomes something that is done and can be comprehended at the micro-level, which does away with the separation between strategy formulation and execution. The shift accords more weight to the social routines and dynamic processes that enact strategy in a fluid emergent fashion. That fluid enactment

removes linearity and barriers between the formation of strategic intent and the enactment of the realized strategy (Leonardi, 2015; Baptista et al., 2021). In a review of strategy implementation research, Weiser et al. (2020) noted that scholars had dropped the *structural control* view in favor of an *adaptive* conceptualization of strategy.

Research addressing the relationship between BI and strategy views strategy as a result of an efficient centralized strategic planning process (Baptista et al., 2021; Earl, 1993; Lederer & Gardiner, 1992). New streams of research, nevertheless, picture strategy as "dependent upon the way it is enacted" (Arvidsson et al., 2014, p. 46). The outcome is a shift to the implementation and practices, and activities that implement strategic objectives in the field to tighten linkages between strategic objectives, BI implementation, and the realized strategy (Baptista et al., 2021; Peppard, Galliers, & Thorogood, 2014). Despite efforts to explore and devise those linkages and synergies between BI and strategy (Benbya et al., 2019), the field still lacks a clear understanding of the fundamental BI mechanisms that give rise to strategy at the micro-level (Baptista et al., 2021) or of the role of human actors in aligning BI with strategy imperatives (Karpovsky & Galliers, 2015). To date, research has still not re-conceptualized the role of technology, and BI in particular, in the essential micro-processes of strategizing to enact strategic objectives (Arvidsson & Holmstrom, 2018; Arvidsson et al., 2014; Baptista et al., 2021; Peppard et al., 2014; Whittington, 2014).

There is still a paucity of studies addressing the strategic significance of BI in the enactment of strategy at the local level (Baptista et al., 2021). While some scholars present strategy as the condition (Jarzabkowski, 2003) under which strategizing is being conducted (Galliers, 2004, 2011), other authors emphasize quotidian practices (Arvidsson et al., 2014; Henfridsson & Lind, 2014; Huang et al., 2014; Leonard & Higson, 2014; Peppard et al., 2014; Whittington, 2014). Notwithstanding that, we still await scrutiny of the influence of BI on the day-to-day activities that constitute the mode of formation of the doings of strategizing and, by extension, the realized strategy (Baptista et al., 2021; Kouamé & Langley, 2018). The doings of strategizing practices with embedded logics and affordances of BI usage in situ are what constitute the realized strategy (Baptista et al., 2021) and thus the question becomes whether BI can act as a carrier of meaning (Schatzki, 2005) to delineate strategic intent to "teams on the ground" (Baptista et al., 2021, p. 3). The subsequent questions must determine how those teams alter existing practices and routines to accommodate BI, and if the new practices are conducive to strategy.

The research focus is currently on establishing a relation between micro-level BI use and macro-level business strategy (Baptista et al., 2021; Chia & Holt, 2006; Chia & Rasche, 2015). BI has the necessary abilities and qualities to form and prompt "local reflective action" (Baptista et al., 2021, p. 3) that is aligned with strategic objectives and hence has the potential to give sense to strategic intent on the ground (Rouleau, 2005). Against this backdrop, it is worth problematizing BI-based practices and whether their reconfiguring brings any value or significance to strategy work, and to the "realizing of strategy on the ground" (Baptista et al, 2021, p. 3). Addresing this avenue requires diverging from traditional views that problematize BI as an issue of execution or a tactical, or local, feedback issue (MacKay and Zundel, 2017). Instead, I seek to re-conceptualize BI—both its role in and significance to strategizing—in a way that transcends the immediate consequences of technological change or digitization (Baptista et al., 2020; 2021).

2.8 Strategy emergence between strategy-as-practice and strategy process streams

The *how* aspect of strategy is the concern of two streams of strategy research (Kouamé & Langley, 2018). Those are the process school (Bourgeois, 1980; Chakravarthy & Doz, 1992; Van de Ven, 1992) addressing the formation and realization of strategy, and the strategy-as-practice stream concerned with strategizing activities and practices (Johnson, Melin, & Whittington, 2003; Whittington, 2007). Both streams investigate the emergence of strategy, albeit with a different focus (MacKay, Chia, & Nair, 2021). While strategy-as-practice research ascribes how strategy emerges into the doings of strategizing at the micro-level (Jarzabkowski et al., 2007; Johnson et al., 2003), the strategy process stream regards the emergence of strategy as an ongoing process that constrains how realized strategy unfolds over time at the macro level (Langley et al., 2013; Pettigrew, 1987, 2012). Despite both research streams sharing an interest in how strategy emerges, there remains no consensus on the relationship between the process of strategy and its practice (Burgelman, Floyd, Laamanen, Mantere, Vaara, & Whittington, 2018; Guerard et al., 2013; Hutzschenreuter & Kleindienst, 2006; Jarzabkowski et al., 2016a; Pettigrew, 2012; Sminia & De Rond, 2012; Vaara & Whittington, 2012; Whittington, 2007; Wolf & Floyd, 2017). That is probably a consequence of neither strategy process scholars nor strategy-as-practice proponents tackling the question of "how process and practice relate to one another in strategy emergence to produce tangible organizational outcomes" (MacKay et al., 2020, p. 2). The failure is due to two main challenges, p. the macro/micro distinction and the metaphysical assumption.

2.8.1 The challenge of the macro/micro distinction

The process school considers strategy emergence a "pattern in a stream of actions" (Mintzberg & Waters, 1985, p. 257) fostered by strategy actors at the macro level (MacKay et al., 2021, p. 1341). Macro-level processes are any organizational phenomena including "characteristics, processes, and behaviors…such as organizational capabilities and strategies" and organizational outcomes "related to the achievement of organizational goals such as strategic change, competitive advantage, and performance" (Kouamé & Langley, 2018, p. 561; see also Salvato & Rerup, 2011). The preceding view stresses the salience of dealing with the behavioral aspects of strategizing (Barnett & Burgelman, 1996; Burgelman & Grove, 2007; MacKay & Chia, 2013; Sminia & De Rond, 2012), and the "relation between strategic content, context, and process" (Pettigrew, 1987, p. 666; MacKay et al, 2021, p. 1341). Process scholars emphasize the "convergence of intended strategy and emergent strategy" (Sminia, 2009, p. 97) in "a long-term conditioning process" (Pettigrew, 1987, p. 666). They view strategizing as starting from the realm of "deliberate and intentional" activity (MacKay et al., 2021, p. 1341) and moving to the "sequence of events" (Van de Ven, 1992, p. 169) and the experience of "actors, actions and decisions processes" (MacKay et al, 2021, p. 1341; Burgelman et al., 2018). Such processes ultimately prevent firms from accomplishing their intended strategy (Sminia, 2009).

In contrast, the strategy-as-practice tradition focuses on the micro level of strategizing "micro-activities involved in the social accomplishment of strategy" (Jarzabkowski & Balogun, 2009, p. 1258; Jarzabkowski & Spee, 2009; Jarzabkowski et al., 2007; MacKay et al, 2021, p. 1341) to deal with "strategy practices (routinized types of behavior and tools that are used in strategy work), strategy practitioners (actors that are involved in strategy work), and strategy praxis (strategic activates conducted in organizations)" (Burgelman et al., 2018, p. 537; MacKay et al., 2021, p. 1341; Vaara & Whittington, 2012, p. 287; Whittington,1996, 2006). Micro-level processes are "individual or collective processes and activities taking place at a lower level than organizational level" (Kouamé & Langley, 2018, p. 561), which subsumes activities such as framing (Kaplan, 2008), interactions (Rouleau, 2005; Westley, 1990), and cognitive processes (Eggers & Kaplan, 2013; Helfat & Peteraf, 2015; Tripsas & Gavetti, 2000) and emotional processes (Huy, 2002, 2011). Following the practice turn, while strategy remains a macro-level concept, it "cannot be reduced, or abstracted, merely to the organizational plan" (Baptista et al., 2021, p. 111). Instead, it is *performative*, that is, constituted and formed by the actors and the tools playing a part in the process of making strategy (Baptista et al., 2021, p. 111; Kornberger & Clegg, 2011; Whittington, 2006; Whittington et al., 2011). On these terms, strategy

must be tracked, at the micro-level, in the practices (doings) of strategy actors. Those practices are disclosed via the adoption and usage of technology, particularly BI (Baptista et al., 2021). Practices are the milieu where strategy occurs (Bourdieu, 1999) and therefore tracing strategy to practices emphasizes the constitutive role of micro-level processes (doings) in organizational objectives at the macro-level (realized strategy) (Baptista et al., 2021; Jarzabkowski, 2004; Jarzabkowski et al., 2007; Jarzabkowski & Wilson, 2006; Whittington et al., 2006). Practices are "constitutive of, and continually re-making, broader social and organizational structures with strategic significance" (Baptista et al., 2021, p. 111; see also Kouamé & Langley, 2018; Schatzki et al., 2001).

Strategy process and strategy-as-practice scholars face concerns about whether both streams will ever connect the local-level processes and practices of ground-level teams and individuals to the broader business strategy, organizational capabilities, and performance outcomes (Johnson et al., 2007; Pettigrew, Woodman, & Cameron, 2001; Szulanski, Porac, & Doz, 2005). There have been calls for studies that connect low-level processes and practices with macro-level strategy and outcomes (Kouamé & Langley, 2018). Some process scholars criticize the lack of courage of the process plan to link micro-level processes to macro-level outcomes (e.g., Pettigrew et al., 2001). Similarly, other strategy-as-practice scholars highlight the necessity to engage with micro-level strategizing and link it to outcomes at the macro level if strategy-as-practice is to understand the doings of strategy (e.g., Johnson et al., 2007; Kouamé & Langley, 2018).

2.8.2 The challenge of the metaphysical assumption

Beyond the micro and macro distinction that distinguishes the levels of analysis of the strategy-as-practice school and the strategy process tradition (MacKay et al., 2021), there is the problem of the metaphysical assumption that permeates both schools. The issue challenges the convergence of process and practice in the emergence of strategy (Chia & MacKay, 2007; MacKay et al., 2021; Sandberg & Tsoukas, 2011; Vaara & Whittington, 2012). Metaphysics is the philosophical branch that offers "a cogent and plausible account of the nature of reality at the broadest, most synoptic, and most comprehensive level…and [seeks] to render intelligible the world as our experience presents it to us" (Rescher, 1996, p. 8). The metaphysical assumption underpinning both strategy process and strategy-as-practice is the "substantialist… which presupposes ultimate reality to be essentially pre-ordered, atomistic and stable" (MacKay et al., 2021, p. 1345). This reality is interpreted as "comprising discrete, identifiable, and stable entities…[where] each entity is assumed to possess properties that are relatively unchanging" (MacKay et

al., 2021, p. 1345). The assumption elevates the idea of "substance, identity, and causality" to be the principal properties of reality (Morin, 2008, p. 34; MacKay et al., 2021, p. 1345).

Therefore, substance is superior to process, individuality is privileged over practices, and stability is accorded a higher value than change because while it is true that change affects things, it does not constitute them (Rescher, 1996, p. 31-35; MacKay et al., 2021, p. 1345). This substantialist metaphysics is apparent in "methodological individualism" (Chia & MacKay, 2007) that presupposes that only individuals carry out actions (Von Mises, 1998;1949), which implies that "processes and practices are epiphenomenal effects of pre-existent individual agents" (MacKay et al., 2021, p. 1345). Accordingly, strategy process is interpreted as a change or a transition from one stable condition to another (Hutzschenreuter & Kleindienst, 2006; Jarzabkowski et al., 2016a, 2016b; Langley et al., 2013; Mintzberg & Waters, 1985; Mirabeau, Maguire, & Hardy, 2018; Pettigrew, 2012; Van de Ven, 1992). This perspective on process is evident in the description of strategy by Mintzberg & Waters (1985, p. 257) as "patterns in streams of action," in Pettigrew's (1997, p. 338) emphasis on the "sequence of individual and collective events, actions, and activities unfolding over time in context, and in Langley et al.'s account of how "managerial and organizational phenomena emerge, change, and unfold over time" (2013, p. 1).

Substantialist metaphysics is also popular with strategy-as-practice scholars (MacKay et al., 2021; Sandberg & Dall'Alba, 2009). The position is evident in how Vaara & Whittington (2012) and Whittington (2006) construe practices, practitioners, and praxis as "self-evident and unproblematic" categories. Other scholars, however, refer to the divisions as "insecure distinctions created through arbitrarily parsing, fixing and naming an essentially fluxing and undifferentiated reality" (Makay et al., 2021, p. 1346; James, 1996;1911). The substantialist position results in SAP scholars dealing with practices as something that strategy actors do (Jarzabkowski et al., 2016b; Johnson et al., 2003; Whittington, 1996), which in turn reinforces the principles of methodological individualism (MacKay et al., 2021). Put differently, the strategy-as-practice tradition bases strategizing (Hendry et al., 2010; Lê & Jarzabkowski, 2015; Whittington, 2006) or sense-making activities (Kwon et al., 2014; Laine & Vaara, 2007; Samra-Fredericks, 2003) upon "the assumed autonomy of the individual actor" (MacKay et al., 2021, p. 1346). The substantialist position that links practices to processes with regard to micro and macro distinction (MacKay et al., 2021) is at odds with the strategy-as-practice insistence on deciphering what is "inside the process" (Burgelman et al., 2018, p. 532) to uncover micro-activities, and process scholars' portrayal of

process as a transition from one stage to another (Burgelman et al., 2018; Mirabeau et al., 2018).

The dominance of substantialist metaphysics hampers any type of theoretical progress on the emergence of strategy within the strategy-as-practice and strategy process research streams (MacKay et al., 2021). Accordingly, the substantialist position assumes that "processes and practices are epiphenomenal to individuals, systems and organizations" (MacKay et al., 2021, p. 1349). That assumption fosters scholarship that understands practices as "the visible doings of strategy practitioners in strategy meetings…rather than a cultivated ever-expanding bundle of interactions" (MacKay et al., 2021, p. 1349; Bourdieu, 1977, 1990; Schatzki, 2005). However, an alternative position to substantialism is a metaphysics that would not anchor the relationship of process and practices in micro and macro or process practice dualistic logics to unearth how local actions contribute to macro practices that yield strategy emergence. In Chapter 5, I argue that this alternative metaphysics is a consequence of the reconceptualization of BI as simulacra.

3 METHODOLOGY

3.1 Research philosophy

3.1.1 A linguistic turn: postmodernism

The linguistic turn is one of the most prominent intellectual directions in management and organization studies (Reed, 2005). It reverses the prevalent realist and objectivist understanding of organizations as bodies with a distinct and independent existence "out there" (Westwood and Linstead, 2001, p. 4), which in turn "legitimates a powerful configuration of explanatory principles and practices that privileges, putatively autonomous, social structures over the cultural processes and discursive practices through which they are created and sustained" (Reed, 2005, p.1622). Conversely, the linguistic 'domain assumption' (Gouldner, 1971) contends that organizations are "discursive constructions and cultural forms that have no ontological status or epistemological significance beyond their textually created and mediated existence" (Reed, 2005; 1622). This assertion promulgated by postmodernists (Hassard, 1993; Hassard and Parker, 1993; Kilduff and Mehra, 1997) draws this thesis to postmodernism as a philosophy that promotes 'radical social constructionism' (Tsang and Kwan, 1999) to conceive of organizations as "discursive constructions" in "the flux of shifting and seamless textual relationships" without "autonomous, stable or structural status outside the text that constitutes it" (Westwood and Linstead, 2001, pp. 4-5). This thesis is thus grounded in postmodernism characterized by its radical reflexive nature, which challenges the basis of knowledge in the scientific literature (Giddens, 1990; Grandy & Mills, 2004).

Postmodernism rests upon three assumptions: "(a) the individual is a fiction, (b) language is shaky and (c) grand narrative is out of fashion as well as bad" (Alvesson, 1995, p. 1056). Its meaning is twofold: It is a cultural or social era after modernism (Giddens, 1990; Rousenau, 1992) and a philosophy that reformulates experiences and descriptions of the world (Gephart, 1996a). As such, it is an outlook on our world, situated at the outer edge of the modern paradigm (Gephart, 1996a, p. 22; Rosenau, 1992, p. 5). That last perspective is akin to pondering "the present historically in an age that has forgotten how to think historically in the first place" (Jameson, 1991, p. 9; see also Gephart,1996a, p. 22). Besides, postmodernism can be pictured as a form of "artistic production" that a) mirrors its status as a cultural front, b) offers a reflective view on "the nature of modernism" (Gephart, 1996a, p. 22; Giddens, 1990, p. 45; Lyotard, 1979;1984, p. 81), and c) lays stress on "an incredulity toward meta-narratives" (Gephart, 1996a,

p. 22; Lyotard, 1979;1984, p. 24). That said, postmodernism disputes the validity of the underlying principles of knowledge, containing as a part of the whole being considered "the myth that history reflects constant progress" (Giddens, 1990, p. 46; Gephart, 1996a, p. 22).

Defining postmodernism is no easy task. Even postmodernists seem reluctant to define its nature, scope, or meaning precisely. They presumably like to employ the term in as many diverse ways as possible (Alvesson, 1995). Attributing different and competing meanings to postmodernism (e.g., Callinicos, 1989; Harvey, 1989; Featherstone, 1991; Ross, 1989) has its merit because the more disorderly its meaning, the better (Alvesson, 1995). As Wilmott (1992, p. 59) puts it:"the contested use of [postmodernism] reminds us that words derive their meaning through a process of struggle between competing usages, and that it is ultimately futile to seek a definitive, universally agreed answer to the question of what "postmodernism" is. Indeed, such efforts to standardize its meaning would seem to contradict what, arguably, is a distinguishing feature of the movement argument of postmodernism; namely the understanding that the (modernist) project of eliminating ambivalence—typified by the establishment of seemingly well-defined rules and procedures to regulate behavior—is not just self-defeating but fundamentally disabling." However, to explicate my choice of postmodernism, one can construe that the term postmodernism acquires its meaning from its "opposition to qualities ascribed to modernism whose assumptions and authority it seeks to disrupt" (Wilmott, 1992, p. 59).

As a philosophy, postmodernism represents a philosophical break from objectivist and positivistic epistemology (see, Figure 2), which positions the credibility and plausibility of science in the capacity to approach "a body of privileged and uncontaminated knowledge which reveals the essentials of the world and guarantees explanation, prediction and control" (Johnson & Duberley, 2000, p. 93). Postmodernism has gained traction among social scientists who were disappointed in positivism and found in the postmodernist maxim an alternative that "offers a new and distinctive means of understanding science that, at first sight, has some radical cachet yet may also be seen as something of a bandwagon for aspiring academics" (Johnson & Duberley, 2000, p. 94).

For postmodernists, positivism/modernism expresses an acceptance that a statement is true in "rational, hierarchical authority", exemplified by "bureaucracy and science", and thereby seeks to offer the rational clue to a finer and superior world through a commitment to "form, purpose and determinacy" (Willmott, 1992, p. 59). An inherent aspect of modernism is dedication to the notion of "rational planning, homogenization and standardization" resulting from

aspirations for a better world that is "expertly designed, perfectly ordered and controlled" where all contradictory ideas are reduced or even completely removed (Willmott, 1992, p. 59). The principle is supported by the supposition that "organizational realities can be authoritatively known and designed by conducting empirical research guided by universal, scientific principles of investigation" (Willmott, 1992, p. 59). Conversely, postmodernism disputes and alters "modernist authority" by directing attention to the kind of reality that the rationalist commitment restrains. It therefore highlights the power of chance and indeterminacy and thereby emphasizes the degree to which modernism represses such factors (Willmott, 1992, p. 59). Postmodernism is therefore connected with "the recognition and celebration of the value of diverse rationalities and, relatedly, with the charge that the one-dimensional application of a supposedly authoritative (scientific) rationality is indefensible and, potentially, counter-productive." (Willmott, 1992, p. 60). Consequently, postmodernism derives much of its credibility from modernism's undeniable lack of success in removing indeterminacy and multiplicity (Berman, 1983; Schorske, 1981). In the words of Bauman (1991, p. 3): "the struggle against ambivalence is both self-destructive and self-propelling. It goes on with unabating strength because it creates its own problems in the course of resolving them…the reduction of ambivalence is a problem of the discovery and application of proper technology: a managerial problem". Modernism addresses contradictory ideas and ambivalence by identifying ways to control them via classification and regulation, as is the case for management, where the modernist endeavor relies heavily on bureaucracy (Willmott, 1992, p. 60).

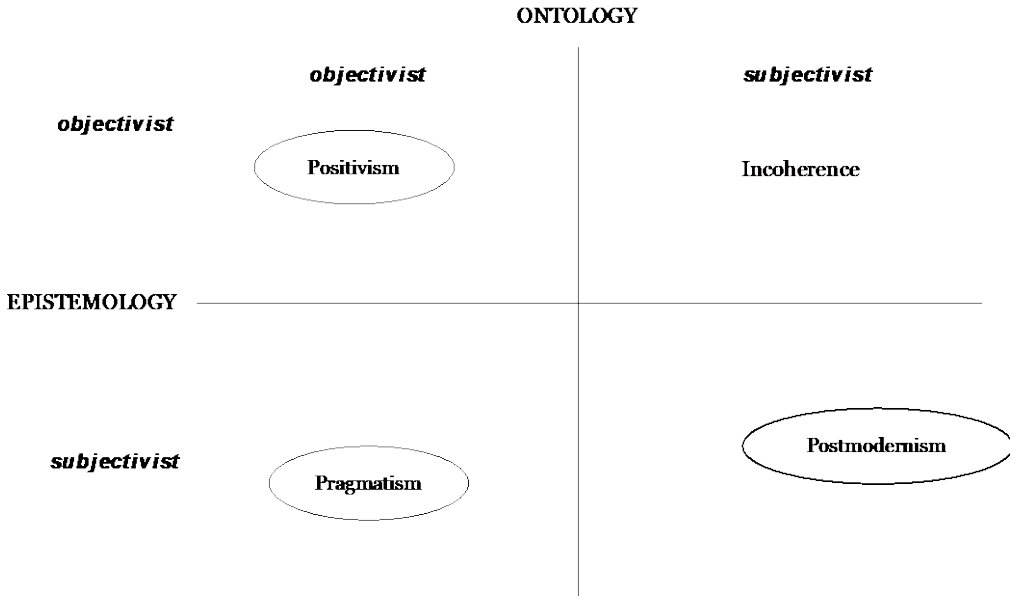

Figure 2. Orientation of postmodernism (based on Johnson and duberely (2000; 2003))

With its commitment to forms dependent on rational and linguistic notions, modernism fails to notice those forms of signification relying upon imagery, metaphor, and association to realize reality (Willmott, 1992; Hines, 1988). Postmodernists view the plausibility of modernism as based on a system of reasoning that methodically subdues its figural quality, that is, how its language establishes reality as opposed to merely representing it (Willmott, 1992). Daudi (1990, p. 299) states: "for postmodern thinkers, any representation is a metaphor, that is to say a figural reflection of a given reality. In this sense, our representations of organizational realities are also figural. The trouble is that the representations which are governed by reason and by modernity's mode of knowing sustain the illusion of being objective and rational, and of conforming to the represented reality; in other words, they claim to be literal".

In management and organization studies, modernism oppresses "irrational actions" and accepts "Taylorism, Fordism and the technologies of flexible specialization" (Willmott, 1992, p. 60) as "rational" (Cooper and Burrell, 1988, p. 100). In contrast, postmodernism sees such a "rational project" (Willmott, 1992, p. 60) as "the attempt to canonize the discourse of the normal over the abnormal" (Cooper & Burrell, 1988, p. 100). In response, postmodernists embrace postmodern concepts and artifacts escape the confines of modernism's rationalist endeavor (Willmott, 1992, p. 60). Rather than drawing on the works of modernists like Weber or Habermas and utilize "critical rationality that is science" to restrain "positive rationality that is bureaucracy and technocracy," committed

postmodernists prefer "a playful, experiential form of rationality that appeals to an aesthetic sense of fun, improvisation and absurdity in preference to what are viewed as modernism's dry, bloodless discourses and practices" (Willmott, 1992, p. 60).

Postmodernism "abandons the rational and unified subject postulated by much modern theory in favor of a socially and linguistically decentered and fragmented subject" (Best & Kellner 1991, p. 4). Put differently, postmodernism rejects positivistic "rational certainty in the attainability of epistemic privilege" and substitutes a different perspective on science and knowledge that is relativist (Johnson & Duberley, 2000, p. 93). Science is thus explained as the result of social construction instead of rational investigation, which erodes its plausibility and in turn enables postmodernism to reveal "the social processes that underpin ostensibly neutral scientific practices" (Johnson & Duberley, 2000, p. 93-94).

Postmodernism is "an incredulity towards meta-narratives" (Lyotard, 1984, p. xxiv) and thus repudiates the grand- or meta-narratives of positivism (e.g., Berg, 1989; Parker, 1992). It also rejects the prospect of constructing a rational and generalizable foundation of scientific inquiry that adopts an objective perspective to deal with phenomena of the world (Johnson & Duberley, 2000, p. 94-95). Postmodernism thus declares "war on totality" (Lyotard, 1984, p. 81) that permeates positivism's quest for finding truth in the "observer's sensory registration of the facts that constitute external reality through the application of a neutral observational language" (Johnson & Duberley, 2000, p. 94-95). In fact, postmodernism rejects the possibility of neutral observational language through its linguistic turn in which language is never innocent. Accordingly, it is impossible for meaning to emerge beyond the borders of language, and a postmodernist holds that the notions of *knowledge* and *truth* are themselves *linguistic* structures open to revision. Another tenet is that "the social bond is linguistic, but it is not woven with a single thread" (Johnson & Duberley, 2000, p. 95; Lyotard, 1984, p. 40).

As such, the postmodernist linguistic turn sees the connection between an idea signifier and its concept relating to the mind as arbitrary because nothing emerges outside the articulation of arbitrary signs that produce an abundance of images because the meaning of any concept "signifier" will emerge only from referring to another concept "signified", which in turn holds meaning hostage of this "free-play" within language and not external to it, which holds the maxim of postmodernism that the "text" of scientific literature cannot refer to any reality "out there" (Johnson & Duberley, 2000, p. 96) as Derrida puts it "there is nothing outside the text" (Derrida, 1995a, p. 136).

In sum, the linguistic turn of postmodernism suggests that the meaning of knowledge or science is fundamentally uncontrollable and constructed by our linguistic conceptions discourses that are "collectively sustained and continually renegotiated in the process of making sense" and eventually yield no one true meaning of science or knowledge but only various disparate interpretations of it (Parker, 1992, p. 3; Johnson & Duberley, 2000, p. 96). After all, "whatever knowledge is, it cannot be justified through metaphors which commit us to thinking that it is an accurate representation of the external world" (Johnson & Duberley, 2000, p. 96-97) Therefore our focus should be on language to identify and understand the features and processes that construct meaning

As such, postmodernism holds that individuals are shaped by discourses and therefore dismisses the idea that individuals, having the power and freedom to form their social realities, occupy the point from upon which social reality is focused or from which social activities and processes are directed (Alvesson, 1995, p. 1056). A primary feature of postmodernism is a perspective that language is never innocent and nothing exists beyond it. Another element of theat perspective is an assumption that knowledge, truth, and the social contract are "linguistic entities constantly open to revision" (Johnson & Duberley, 2003, p. 1285; Lyotard, 1984, p. 40). Because "linguistic schemes" produce reality (Johnson & Duberley, 2003, p. 1286) and repudiate the (subject/object) distinction (e.g., Chia, 1995; Jeffcutt, 1994; Kilduff & Mehra, 1997) the effect is to dismantle the dedication to "reality as an independently existing reference point" (Johnson & Duberley, 2003, p. 1286) because the world is no longer out there "waiting for us to reflect it" (Cooper and Burrell, 1988, p. 100).

The postmodern antithesis, to which this dissertation ascribes, depicts knowledge on BI as "being produced by particular language games which, via their own rules and structures, produce a plurality of localized and incommensurable understandings which offer no epistemological basis for preferring one manifestation over alternatives" (Johnson & Duberley, 2003, p. 1286). Therefore, notions of truth or reality concerning the nature of BI are a "socio-linguistic artifact" where explanation is found in the dominance of discourses proprietary to a certain way of life (Johnson & Duberley, 2003, p. 1286). As a postmodernist exploration, this thesis abstains from any authoritative recommendation of strategy, technology, management and organization studies other than "the search for instabilities' (Lyotard, 1984, p. 54; see also Johnson & Duberley, 2003, p. 1286) that disturb accepted narratives (Barry, 1997) and articulate "tolerance of a range of meanings without advocating any of them" (Rosenau, 1992, p. 139).

Further, as a postmodernist endeavor, this thesis first dismisses any analysis of the BI literature that assumes its evolution is a "progressive accumulation of knowledge" because this would instill a grand narrative as the "truth-claim" (Johnson & Duberley, 2000, p. 101). Instead, it considers the "constituent disciplines" of the BI literature "not as resources" for treating various features of reality, but, rather, as socially constructing distinct discourses of different genres of reality that construct the knowledge about BI (Johnson & Duberley, 2000, p. 101). Second, the thesis "de-centers the subject" because postmodernism rejects the premise that individuals, as free and independent knowers, are the producers of meaning or the subject of analysis (Johnson & Duberley, 2000, p. 101). Instead, individuals are considered conduits and products of discourses. Therefore the development of any scientific discipline rests upon its discourses. Subsequent analysis ought to focus on the underpinning regulations, principles, taken-for-granted assumptions, and "categories which socially construct subjectivity by enabling and limiting what is thought, said or written about a particular disciplinary domain" (Johnson & Duberley, 2000, p. 101-102).

3.1.2 An ontological turn: Peirce's semiotics

Unfortunately, postmodernism promotes anti-realism (Reed, 2005) through social constructivism insists that the different manifestations of knowledge dictate the frontiers of their 'object domains' because it levies "an interrelated set of conceptual categories, epistemological rules, and discursive constructions through which 'what can be known' and 'how it can be known' is brought into existence as a recognizable and legitimate object of study" (Reed, 2005, p. 1622-1623). This doctrine of knowledge is nominalist at heart because it assumes that *objects of our knowledge* are mere names of our own creation that lack any corresponding reality, which essentially expels ontology and enthrones epistemology as "gatekeeper and bouncer for methodology" (Archer, 1995, p. 22) that forms the 'nature' of our being and world by means of the discursive properties and practices that conceive it and thus lays waste to the ontological foundation of management and organization studies (Reed, 2005; McKelvey, 2003).

Therefore, a postmodernist philosophy is 'ontologically mute' (Gergen, 1994, p. 8) for it insists that "the realities we deal with are essentially a product of everyday language and their translation and reformulation into 'expert discourses' of one kind or another" (Reed, 2005, p. 1624). In this vein, our spoken or written words about our world along with the practices that convey these expressions become "our reality and forms the basis for ontological constructions that remain irredeemably uncertain and ambiguous in relation to their inherent meaning and

implications for action" (Reed, 2005, p. 1624). For instance, there is no ontological attempt to describe what distinguishes the material 'out there' from the one 'in here' because once we engage in exploring the nature that which there is, we already find ourselves in the realm of discourse and language in which the social constructionism ontology is caught up due to the imprint of postmodernism (Gergen, 1994, Burkitt, 1998) that brings the analysis of social structures and systems to the underlying form that produced them, that is, 'text' (Reed, 2005) and rejects the epistemology of representationalism and the realist ontology which assume that textual forms can produce social processes that reflect and affect social phenomenon in the external world, but cannot be observable in it (Burkitt, 1998) because under social constructivism the frontiers of discursive practices dictate the constitution of our world and therefore there is no distinction between "a discursively constituted 'social reality' and a social reality that exists and changes independently of any particular discursive construction or mediation" (Reed, 2005, p.1625). As such, what we know about an object denotes *that object in itself,* and therefore we cannot fathom any complex reality that we co-constitute with other elements such as socio-materiality, let alone its underlying non-discursive generative causal mechanisms that radical social constructivism circumvents (Reed, 2005).

"The descent into discourse" (Harvey, 1996, p. 85) warrants an ontology that treats organizations as 'text' and their social dynamics and organizational practices as consequences of language "which is to be investigated and analyzed as a symbolic order characterized by a radical heterogeneity of discourses that defines the scope and substance of what can be said and known about it. As a result, it is splintered into an array of unresolvable differences and fragmented into a universe of diverse and contested identities in which any recourse to notions like 'structure'—as referring to pre-existing socio-material conditions that constrain agency—is either excluded or translated into, that is reduced to, its discursive moment within a discursive field that is exhaustive of social ontology" (Reed, 2005, p. 1626). Within such ontology, discursive practices produce social structures, which implies the latter cannot generate social phenomena on their own since their existence and representation emerge only through discursive constitution whose pre-existing social and material conditions—that persist regardless of acknowledgment—are ignored (Reed, 2005) and therefore require their independent status to be accounted for through the "ontologically objective reality out of which it is constructed… a socially constructed reality presupposes a non-socially constructed reality" (Searle, 1995, p. 190).

This ontological limitation, inherent to social constructivism and associated with the postmodernist philosophy, suggests a turn to ontology through Peircean's

semiotics "as a philosophy of science and as a meta-theory specifying the ontological presuppositions on which scientific research and explanation must be based" (Reed, 2005, p. 1629). The turn to ontology in this thesis converges with the new materialists' post-humanism (Barad, 2007) but diverges from it in their sloughing off of semiosis. That is because it eventually resolves into the same 'human/material' separatism that an ontological turn sets out to sideline. New materialists conflate language with representation and that permeates their symmetrical treatment of the human and material by depriving the human of their intentionality and conferring agency to the material. Therefore when they call for material agency or account for the material domain, they are still tacitly dividing the human from the non-human, and despite their best efforts to escape this conundrum, their sloughing off of semiosis results in transferring discursive and human attributes to the material (Crossland & Bauer, 2017; Kohn, 2013).

In contrast, Peirce's categories of potential signification cut across the frontiers of the material, discursive and the human and thus allow us to understand how the transfer between discursive, material, and human takes place beyond the boundaries of each domain because these relationships transcend the characteristics of each domain and become about the quality of resistance, potential, and mediation of semiosis (Crossland & Bauer, 2017). Therefore, the new materialists' emphasis on the resistance of the material and its intrusion into our representational and discursive frameworks and its ability to mold them to its best image remains beyond the purview of this thesis. That endeavor has already been the subject of the call of the return to 'thingness' (cf. Latour, 2004; Lather, 2007).

This return to the 'obdurate thingness' of things is subject to our present, the actual, the empirical, or in Peirce's terminology 'the secondness' (Crossland & Baeur, 2017). While certainly of merit, thingness does not help us understand how the material obduracy to human representation is conceived, let alone clarify the uniqueness of each material or how it treats all material as resistant. It is only one part of what happens in the realm of the actual 'secondness' (Crossland & Bauer, 2017). In response, Peirce's semiotics offers a term that attends to the material as this(one), its 'this(iness)', its specificity, its uniqueness, its *haecceity* (Crossland & Bauer, 2017). Haecceity separates the particularity of material from its material quality, its quiddity, for instance, its resistance, its softness, its malleability (Crossland & Bauer, 2017). The debate on new materialists' post-humanism is caught in 'secondness', which while pointing to the thingness or haeecity of the material, it re-inscribes the Cartesian separatism of mind and matter, known and knower, and continues thinking of the world in terms of things and their representational signs (Crossland & Baeur, 2017). In the midst of it all, the

human–material couplet is left unchartered. The lack of scrutiny extends to its experience and all the possibilities of its relationships and the ensuing patterns of social order and emerging phenomena (Crossland & Bauer, 2017).

Peirce's categories of signification leap over the boundaries of entities and decenter our thought of the world from the Cartesian epistemic dualism, and open up the possibility to explore the unfolding of the semiosis process of life beyond the nature of its elements (Colapietro, 1989; Crossland & Bauer, 2017). These participants in the semiosis process are understood not by their pre-existing nature or qualities but through their engagement in the process, which unfolds unevenly according to their interaction with other participants and under various circumstances (Crossland & Bauer, 2017). Therefore, Peirce's semiotics provides a way to escape the entrenched Cartesian divide of subject and object (Crossland & Bauer, 2017).

Semiosis is the process of relationality and action of signs, objects, and interpreters (Queiroz & Merrell, 2006). Semiotics is a snapshat of this process that we actualize as signs to explore its interaction and interelatedenss (Querioz & Merrell, 2006). Peirce's semiotics transcends Saussure's radical dichotomy between the sign and the material world and brings the object of signification that Saussure eliminates back to semiosis (Irvine, 1996; Keane, 2003). Saussure's distinguishing between signs and their concrete objects and between the human and the material permeates social analysis and post-structuralism and forces us to divide between thoughts and things (Keane, 2003). This reduces the material to an expression of thoughts and transfers its consequentiality to the human who gives meaning to the world (Keane, 2003). In contrast, Peirce's semiotics recovers the object, not through direct access to its instantiations, but through mediation that produces further signs (Keane, 2003). Peirce's object and sign belie their names (Crossland & Bauer, 2017). The former extends to ideas and feelings and is not restricted to objects; the latter is not limited to actuality but also transcends to cover what is potential or barely recognizable (Crossland & Bauer, 2017). As a corollary, Peirce's semiotics does not limit materiality to the mediation between the human and the material but opens it up to a world of possibilities that does not assume its ontology or that of other signs' relations (Crossland & Bauer, 2017). Therefore, Peirce's semiotics dissolves the dualism between the human and the material, for it views causality and thought as semiotic (Pickering, 2007). It attaches itself to a universal causality through the development of signs across the physical, biological, and cultural realms (Pickering, 2007). For Peirce, agency is the mediation between the first, second, and the third in the process of semiosis (Nöth, 2011). "It is the immediate consciousness that is preeminently first, the external dead thing that is preeminently second. In like manner, it is evidently the representation mediating between these two that is preeminently third… The first is agent, the second

patient, the third is the action by which the former influences the latter" (CP 1.361)[1].

Peirce's semiotics treats signs broadly and agnostically for they exist beyond the human and so does their representation, irrespective of the nature of signs and who uses them (Kohn, 2013). For Peirce, representation is the resultant of a triadic relationality and cannot be accounted for through a dyadic relationship in which language represents things (Nöth, 2011). Consequently, a sign (representamen) "stands for something" (a represented object) to "somebody in some respect of capacity" (an interpretant) (CP 2.228; Nöth, 2011). Accordingly, representation is not dualistic between relata A and B but a triadic relationship where A represents B to C (Nöth, 2011). Representation is broader than the grammatical sense in so far as it can be understood by instances rather than by synonymous or definition (Nöth, 2011). Its verb "to represent" is trivalent rather than bivalent in the sense that it involves three correlates: a representamen, an interpreter, and an object of representation (CP 2.86, 1.345). For instance, a strategy map represents the strategy of an organization to "the conception of them who understand it" (W2: 54; CP 1.553, 1867).

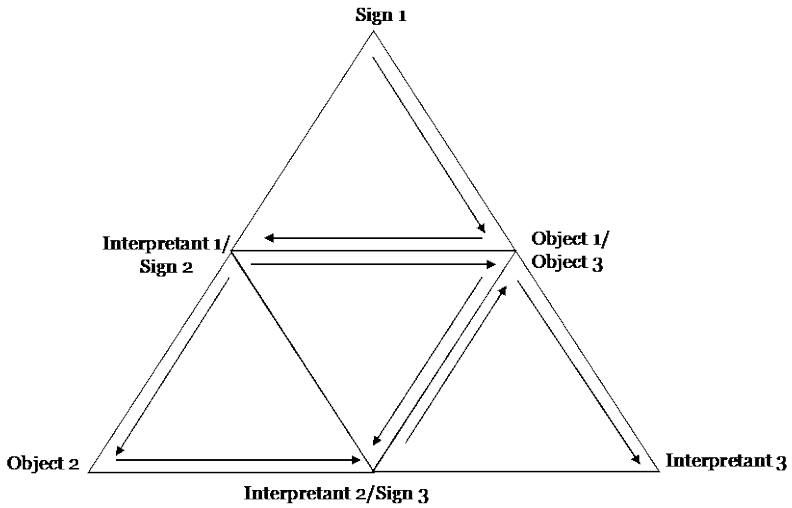

Figure 3. The semiotic triad (based on Spinks (1991) and Chandler (2007))

Peirce's representation subsumes Kant's inward representation (mental thoughts) and expands to account for outward representation 'external signs' (Nöth, 2011). Figure 3 illustrates how Peirce's triadic system ascribes the same status to thoughts and external signs, that is, a sign in the semiosis process (Nöth, 2011).

[1] Hereafter all references to the works of Charles Peirce will follow this standard form of citation used by Peirce scholars: the initials of the title of Peirce's work followed by the volume and paragraph numbers. CP stands for The Collected Papers of Charles Peirce; EP for the Essential Peirce; W for The Writings of Charles Peirce

Consequently, signification exceeds the realm of the human and is the result of sign relations between three elements that form the semiotic triad: the sign, object, and the one mediating between these two, that is, the interpretant (Crossland & Bauer, 2017). The semiotic triad can accommodate interchangeably objects, qualities, practices, and habits since each of its elements cut across one another (Crossland & Bauer, 2017). Every thought is a representation (sign) of an antecedent thought (object) and produces another thought (interpretant) in the mind (W 3: 62–63, 1873). The interpretant does not reside in the mind but in the elements of the world and can be glossed into the emotional interpretant (a feeling of potentiality); the energetic interpretant (a reaction), and finally the logical interpretant (a change in habit) (Crossland & Bauer, 2017). For instance, a server built to store structured data is an interpretant of the capacity of data to be kept structured and stored. Similarly, BI and its analytics built to structure and analyze data are an interpretant of an anticipated future collection of data. Peirce's interpretant is similar to Gibson's (1979) concept of affordances, in so far as it discontinues interpretation from the subject, and by extension its cognition, and projects it onto the human and material practices (Pickering, 2007; Crossaland & Bauer, 2017).

For Peirce, the relationships and action of signs occur across three categories of the real: 'firstness' (what might be), 'secondness' (what is because of its relationship with something else), 'thirdness' (all that might be in virtue of mediating between two things and itself) (Houser et al., 1997; Queiroz & Merrell, 2006;). Firstness is "the mode of being which consists in its subject's being positively such as it is regardless of anything else. That can only be a possibility…" (CP 1.25). Secondness "consists in one thing acting upon another… any dyadic relation not involving any third…"(CP 8.330). Thirdness involves "… mediation, habit, generality, growth…"(CP 1.340). By means of illustration, the real we are wired to comprehend, thanks to decades of Cartesian dualism, the real that is out there in the world is what Peirce terms "secondness" (CP 1.23–26). The apple hitting Newton's head is secondness in so far as it is a "shocking" (CP 1.336), "brutal" (CP 1.419) event that disrupts habituality and pushes us to think differently (CP 1.336; Kohn, 2013). However, Peirce does not limit realism to secondness. He was concerned about a much broader realism that could encompass his semiotics and, therefore, a non-dualistic view of our existence in relation to spontaneity and emergence (Kohn, 2013). The kind of realism that could accommodate the human and non-human and account for how the former emerges from the latter (Kohn, 2013). He devised a triadic realism of which secondness is only one aspect. Firstness is the aspect that involves raw spontaneity, quality, feeling, in a vacuum, detached from anything else (CP 1.304; Kohn, 2013). Firstness is the real in its "own suchness" (CP 1.424). The last aspect of Peirce's

realism is *thirdness*. Thirdness concerns the world's "tendency to take habits" (CP 6.101). It is the tendency of taking habit of all entities in the universe, a tendency to have patterns, purposes, and regularities (CP 1.409; Kohn, 2013). It does not occur in the mind, nor is it imposed by it; it is innate in the world: the generality that conditions semiosis (Kohn, 2013).

For Peirce, meaning is the result of the relationality between the components of the complex (sign-object-interpretant) (CP 4:536; EP:429). In this regard, the sign is a 'conveyer'—a 'medium' of an 'embodied meaning' in the object, such as a habit or a form to the interpretant (MS, 793; Querioz & Merrell, 2006). Therefore, that meaning conveyed is a form, not an actual, a general, a tendency toward becoming under certain conditions; that form is a third (MS 793; Querioz & Merrell, 2006). A Peircean sign is, hence, a *medium for conveying form* and a *triadic complex* that is both determined by its interpretant and determines its object (Queiroz & Merrell, 2006). Semiosis is then a triadic process of a sign mediating between an object and an interpretant to convey form (Queiroz & Merrell, 2006). Form is the 'being of predicate' by virtue of certain conditions (EP 2.544; EP 2.388). Form is not tangible, it is not existent, nor is it a living human or non-human (Tienne, 2003; Querioz & Merrel, 2006). It is 'rule of action' (CP 5.397, CP 2.643), a potentiality (EP2.388), a 'disposition' (CP 5.495, CP 2.170) that the object embodies (EP 2.544, n. 22). Form reveals firstness and thirdness (Queiroz & Merrell, 2006).

Besides the triadic categories of real, the relationships of semiosis are also irreducibly triadic in so far as each sign "…is determined by something other than itself called its object, while, on the other hand, it so determines some actual or potential mind, the determination whereof I term the interpretant created by the sign, that the interpreting mind is therein determined mediately by the object…" (CP 2.171; CP 2.274; CP 2.242; CP 8.177). Therefore, for Peirce, the term sign refers to the first component of the triad and also to the triadic relation of signification between the sign, object, and interpretant (Queiroz & Merrel, 2006). In this sense, the triad is not reducible to its components, nor can any of them be defined without the other two (Savan, 1987; Queiroz & Merrell, 2006). In addition, semiosis is an ongoing process where each triadic relation gives way to the subsequent one, and what is interpretant in one triadic relation is the sign of the subsequent one, and the same holds for any of the components of the triad, for none of them has any distinct properties (Queiroz & Merrel, 2006; Savan, 1986; Tienne, 1992). The triad (sign-object-interpretant) is not static and located in a vacuum; it is dynamic and extends to other triads. Together they form a web of triads thanks to the process of semiosis (Haussman, 1993; Queiroz & Merrel, 2006). However, signs do not act

unless they are embodied in space and time (Deacon, 1999; Querioz & Merrel, 2006).

Contrary to linguistic semiotics, the Peircean triadic system comprises not only the relations between the sign and interpretant (signifier and signified for Saussure and Barthes, respectively) but is also devoted to the relationship between the sign and the object that determines it (Keane, 2003). Under the Peircean model, this relationship is one of iconicity (the sign resembles the object and whereof stands for it), indexicality (the sign stands for its object through causality), or symbolism (the sign represents the object via an arbitrary rule-like relation like a convention) (Keane, 2003). Similarly, each of the three modes of reference involves an absence through which the future comes to affect the present: that which is not noticed (icon); that which is a future possibility (index); that which is a context for meaning (Kohn, 2013). The interplay between the three modes of signification alludes to non-linguistic representation properties of the icon and the index that are different from the linguistic representation of the symbolic (Kohn, 2013).

This representation beyond symbolic representation pushes us to what Kohn (2013) terms 'provincializing language', that is, recognizing that although our contexts (language, history, culture, society) are in fact a product of the symbolic, our world is not limited to these symbolic contexts, and therefore prompts a different kind of representation that is neither a human affair nor language-like (Kohn, 2013). Thinking and representation are in the world beyond the confines of the human and thus, it behooves us to think of them as part of semiosis so as to explore the different modes of representation beyond the human, the mind, and life itself and therefore to erase the 'human/material' dualism (Kohn, 2013). Under Peirce's semiotics, agency is in the world and therefore extends beyond the realm of the human (Kohn, 2013). That status does not reduce agency, akin to new materialists' socio-materiality, to effects shared indiscriminately by the human and the material through their mutual entanglement in intra-actions. It therefore does not confer humanlike thought properties upon the material and overlooks the minutiae and particularities that distinguish the arbitrary sign (symbol) from the non-arbitrary modes of reference (iconic, indexical) (Kohn, 2013).

3.2 Research approach

3.2.1 Top-down deduction vs. bottom-up induction

Rethinking ways of theorizing phenomena is frequently recommended in management and organization studies, although the activity is not as straightfor-

ward as it sounds (Shepherd & Sutcliffe, 2011; Locke, Golden-Biddle, & Feldman, 2008; Weick, 1989). If we take Newton's apple as an illustrative example, inductive reasoning would suggest that observing the instance of the apple hitting Newton's head is the start of an inquiry moving toward generalizable theory; however, deductive reasoning would insist that the law of gravity must be the beginning of the inquiry, if the inquirer is to determine whether gravity acted upon the fallen apple (Hyde, 2000; Shepherd & Sutcliffe, 2011). As such, deduction adheres to a top-down theorizing approach that "begins at the intersection of the theorist and the existing knowledge typically contained in the literature [wherein] the theorist discovers a problem in the literature—tension, opposition, or contradiction among divergent perspectives and explanations of the same phenomenon—and then sets out to create a solution to that problem" (Shepherd & Sutcliffe, 2011, p. 361).

Scholars following deductive reasoning diverge from the inherent and accepted assumptions of what we already know (Krippendorff, 1984) by questioning and re-evaluating by proposing new hypotheses and empirically testing phenomena (Shepherd & Sutcliffe, 2011). Deductive reasoning requires "going from generals to particulars; deriving conclusions based on premises through the use of a system of logic" (Samuels, 2000, p. 214). Deductive reasoning thus adopts a top-down approach to refine previous knowledge to build theory (Shepherd & Sutcliffe, 2011).

However, deductive top-down theory-building often "focuses exclusively at the level of variables rather than the level of constructs" (Shepherd & Sutcliffe, 2011, p. 363). The effect is to settle for limited common-sense suppositions that lack sufficient "explanation of why the theory or approach leads to a new or unanswered theoretical question" (Sutton & Staw, 1995, p. 373). The better alternative would be to seek higher levels of abstraction to devise a general theory (Thompson, 1956, p. 110; Weick, 1996) associated with "current knowledge (of a community of scholars)" and explain "the causal reasoning of the proposed relationships" (Shepherd & Sutcliffe, 2011, p. 363).

In contrast, induction follows a bottom-up form of theorizing that "begins at the intersection of raw data and a theorist's general wonderment" (Shepherd & Sutcliffe, 2011, p. 361) and lack of certainty about what the data might generate (Glaser, 2001; Clarke, 2005). Inductive reasoning relies on coding, clustering, and inference, as idea or theory (Dey, 1993) the potential contribution of which is then contrasted with other theories constituting the bulk of the literature (Shepherd & Sutcliffe, 2011). Because it does not begin "close to the phenomenon," classic inductive bottom-up theorizing can overlook constructs and relationships that might be salient to defining and revealing the subject matter (Shepherd & Sutcliffe,

2011, p. 364). As such, researchers applying inductive theorizing run the risk of imposing their underlying emotions and motives onto the data (Wilson & Hutchinson, 1996).

Another shortcoming of researchers applying inductive bottom-up theorizing is that researchers often do not go beyond describing the phenomenon and its "variables and constructs" (Shepherd & Sutcliffe, 2011, p. 364). That explains why many scholars warn those using grounded theory and undertaking inductive top-down theorizing not to cease their theorizing once they have elaborated their conceptual descriptions (Glaser, 2001; Morse, 1994; Sandelowski, 1997) and variables (Glaser, 1992; Merton, 1967; Sutton & Staw, 1995). Doing so can lead such researchers to fall into the trap of "developing a rich description of the specific cases under study [rather] than developing generalizable theory". With respect to strategy research, this risk was highlighted by none other than Eisenhardt, (1989, p. 546), who also emphasized that "some grounded theorists are more concerned with developing a rich description of the specific cases under study than developing generalizable theory".

The same holds for science and technology studies where such theorizing led Black, Carlile, and Repenning (2004, p. 574) to note that: "although, as Glaser and Strauss argued, the progressive consolidation of substantive analyses into more formalized, general categories is a key step in developing theory that spans multiple inquiries, few scholars of technology implementation have made such an attempt to provide a more general account of the influences between new technology and social action. Until such theories are produced, it will be difficult to test empirically our understanding of the impact of new technology to improve theory or provide useful advice to practitioners". The aim of good theorizing is both to "describe and explain," for research that only describes is deficient in "scope and abstraction" (Shepherd & Sutcliffe, 2011, p. 364), and therefore cannot offer a generalizable account of why certain observations and conclusions persist (Glaser & Strauss, 1967; Sutton & Staw, 1995).

To overcome these issues of classic inductive reasoning, some scholars have proposed a hybrid version of bottom-up theorizing that also includes deduction (Shepherd & Sutcliffe, 2011). They argue against the separation between deduction and induction and assert that both approaches to reasoning cannot be disentangled because theoretical analysis is an ongoing and iterative process, and therefore, the activity of theorizing should occur prior to, throughout, and subsequent to data collection (Fine, 2004; Gunter, 2005). The purest form of the classic inductive bottom-up approach is beyond the bounds of possibility as it necessitates that the researcher commences with the data without considering the

theory in production. That would require researchers whose purpose is theory-building to begin their inquiry with an a priori preconception of the research question, the site, data sources, and constructs, to reduce the risk of data overload and provide the most suitable cases for building theory (Eisenhardt,1989; Shepherd & Sutcliffe, 2011, p. 364).

In summary, both classic deductive and inductive forms of theorizing have shortcomings that hinder their ability to become the go-to method for theory generation (Shepherd & Sutcliffe, 2011). Deduction is criticized for generating uninspiring, arguable theories that cannot be investigated thoroughly (Weick, 1996; Shepherd & Sutcliffe, 2011), while induction is faulty because it demands "going from particulars to generals; deriving knowledge from empirical experience based upon a system of handling sense data" (Samuels, 2000, p. 214). It is therefore commonly associated with bottom-up theorizing that while it begins with data, is not close enough to the subject matter (Shepherd & Sutcliffe, 2011). Typically, when researchers begin with data far from the phenomenon, their preformed views and "naïve theories" steer their focus toward particular features of the data. That restricted focus limits their perception (Shepherd & Sutcliffe, 2011, p. 364; Poole & Van de Ven, 1989), the likelihood of data speaking to them (Glaser, 1992), and the accessibility of a thought or suggestion on a possible course of action (Glaser, 2001).

3.2.2 Self-correcting top-down induction

To bypass the limitations mentioned above relating to classic theorizing approaches to inductive and deductive reasoning, Shepherd and Sutcliffe (2011) draw on coherence theory to bring inductive reasoning to bear on a top-down approach to building theory that "integrates aspects of deductive, inductive, and abductive approaches to theorizing" (362). Coherence theory has two conceptual subdivisions (Shepherd & Sutcliffe, 2011). The first is the coherence theory of perception, that is, a "sensory representation" associated with where the researcher's attention is oriented, and that is therefore concerned with "how data as quanta are turned into a representation…to 'see' objects or relationships between objects" (Shepherd & Sutcliffe, 2011, p. 365; Rensink, 2002).

Processes like preconceived knowledge, acquired through previous experience, or the emergence of "gist", that is, the fundamental representation of an environment that "does not require attention to stabilize a subset of the environmental stimuli" (Shepherd & Sutcliffe, 2011, p. 365 Oliva & Torralba, 2001; Rensink, 2002), direct our attention toward particular aspects of the environment and are kept in a "coherence field" that is responsible for "the sensory representation of the

environment" (Shepherd & Sutcliffe, 2011, p. 365). Considering our finite ability to focus our attention (Kahneman, Treisman, & Gibbs, 1992; Simon, 1947), we can only attend to a particular set of data at a time (Shepherd & Sutcliffe, 2011). Attention forms "a limited and temporary coherence field to capture the nature of the phenomenon" in the sense that when attention is focused on a certain aspect of the phenomenon, the coherence structures, and their associated sensory representations are retained (Shepherd & Sutcliffe, 2011, p. 365; Wolfe, 1999).

Considering the limited capacity to maintain attention for extended periods, the coherence theory of perception can offer "a sensory representation of the environment" to elucidate the action or process of identifying the presence of something concealed such as detecting changes relating to our sight or hearing (Shepherd & Sutcliffe, 2011, p. 365; Horvaath, Czigler, Sussman, & Winkler, 2001; Rensink, 2000). However, not altering or abolishing these sensory representations over time necessitates another branch of coherence theory, that is, explanation, which "relies on a system other than attention—a system based on beliefs" to address the question of how our perception becomes represented in (and is influenced by) beliefs" (Shepherd & Sutcliffe, 2011, p. 365; Lehrer, 1992; Merricks, 1995; Walker, 1989). Accordingly, researchers approach data and draw conclusions from it following a continuous and frequentative cognitive process, to convert it to a logical and consistent mental representation capable of revealing a certain phenomenon and making it comprehensible (Shepherd & Sutcliffe, 2011; Read, 1987).

Coherence theory depends upon what is termed a connectionist network, whose nodes represent explanations. Nodes are interconnected via loops in the network chain regulated by "a parallel constraint satisfaction process" (Shepherd & Sutcliffe, 2011, p. 365; see also Simon, Pham, Lê, & Holyoak, 2001). That process safeguards the movement toward constructing a coherent narrative by eliminating a network of inferences with a "lesser activation" and promoting only those with "a greater activation" to interpret data (Shepherd & Sutcliffe, 2011, p. 365; Read, 1987, p. 293).

This process is parallel because it is a bidirectional movement where "the sensory image of data informs the conceptual representation, and the conceptual representation informs the formation of the sensory representation; both the sensory representation (different data attended) and the conceptual representation can change to close the gap between the two" (Shepherd & Sutcliffe, 2011, p. 365; see also, Holyoak & Simon, 1999; Simon & Holyoak, 2002; Simon, Krawczyk, & Holyoak, 2004; Simon, Snow, & Read, 2004). For instance, in a trial where members of the jury are asked to come to a "verdict in a complex legal case

involving multiple conflicting arguments", each single argument gives a formative principle to a verdict, and that verdict becomes the reason or motive for altering the evaluation of each argument in such a manner that augments "coherence between the verdict and the arguments", and therefore builds a coherent story that is trusted as "a plausible explanation of the phenomenon" (Shepherd & Sutcliffe, 2011, p. 365; Holyoak & Simon, 1999, p. 3; Pennington & Hastie, 1992; Read, 1987; Read & Marcus-Newhall, 1993).

To build their inductive top-down theorizing model, Shepherd and Sutcliffe (2011, p. 366) resort to "the literature, induction, and abduction" and join to it four notions from coherence theory. From its perception branch, they import the notions that "the nature of sensory representations of the environment depends on where attention is focused [and that]attention is a limited resource that can be focused by the environment itself or by prior knowledge and contextual influences". Accessing the explanation subdivision, the same study builds on the notions that "a conceptual representation is created and modified to offer a coherent, lasting explanation of sensory perceptions (which can also be modified) [and that] a coherent explanation can be replaced by a more coherent explanation" (Shepherd & Sutcliffe, 2011, p. 365-366).

Classic inductive theorizing follows a bottom-up process that starts with raw data on an organizational subject, such as studies following grounded theory or the case study method (Dey, 1993; Dyer & Wilkins, 1991; Glaser, 2001; Shepherd & Sutcliffe, 2011, p. 366). The researcher infers notions and linkages from the data to inform explanations of the subject matter and eventually build a "theory of organizing" (Shepherd & Sutcliffe, 2011, p. 366). However, inductive reasoning is also applicable to top-down theorizing where data are not "the rapidly generated volatile structures that contain information about phenomena" (Shepherd & Sutcliffe, 2011, p. 366; Daft & Weick, 1984), and are instead, "the array of rapidly generated volatile structures that contain information that exists in the literature" (Shepherd & Sutcliffe, 2011, p. 366).

As such, on the terms of inductive top-down theorizing, I firstly begin with "coherence theory's notion of gists" to identify a "doubt"—a hypothesis about the nature and definition of BI from the literature and my prior knowledge and intuition—that will direct my attention through a top-down inductive process of inquiry and "refinement" that is in tandem with "abductive reasoning" (Shepherd & Sutcliffe, 2011, p. 375-376). Abductive theorizing is a process of inquiry that follows "an anomaly to the delineation of a kind of explanatory hypothesis which fits into an organized pattern of concepts" (Paavola, 2004, p. 279). As such, abduction emanates from "doubt" (Shepherd & Sutcliffe, 2011, p.362; Anderson,

2005; Hildebrand, 1996; Paavola, 2004) that proceeds from "an indeterminate situation that gives rise to the focusing of attention on and/or formulation of a problem, which becomes the impetus for abductive inquiry" (Shepherd & Sutcliffe, 2011, p.362; Dewey, 1989). The inductive top-down model of theorizing, nonethless, differs from classic abduction in two ways: it does not focus on "data about the phenomenon" but instead on "data as represented by the literature"; it does not concern itself with "observation to build hypotheses about the experiential phenomenon," but instead brings to center stage, as the initial point of theorizing, the way the "tensions, oppositions, and contradictions" in the literature influence and direct the researcher's a priori focus (Shepherd & Sutcliffe, 2011, p. 376).

Second, I turn to data drawn from the literature to elicit "problems (tensions, conflicts, and/or contradictions) and potential solutions (literature, theories, constructs, relationships)" to explain a research problem and thereby re-conceptualize BI (Shepherd & Sutcliffe, 2011, p. 366). This approach draws from the "central role of attention in the coherence theory" (Rensink, 2000; 2002) to investigate how the BI literature "as an undifferentiated flux of data" can direct the researcher's attention toward particular aspects and papers to conceive a "sensory representation" (Shepherd & Sutcliffe, 2011, p. 366).

The "sensory representation" of the author of this thesis is a discernment of "tensions, oppositions, and/or contradictions" (Shepherd & Sutcliffe, 2011, p. 366) extracted from disparate views and descriptions of the topic of BI and its relationship with strategy in a cross-disciplinary scholarly body of work. Having developed a "*sensory representation"*, the author constructs a "*conceptual representation"* reflecting a provisional answer to the treatment of the nature of BI—an answer that employs ideas not stated in the data (Shepherd & Sutcliffe, 2011, p. 366; Dyer, 1986). That "conceptual representation" alludes to "*general abstract statements"* on connections between BI, its related terms, and strategy—including descriptions of "*how"* and "*why"*, "boundary conditions of values", and "assumptions of time and space"—which enable a coherent resolve of the researcher's "sensory representation" (Shepherd & Sutcliffe, 2011, p. 366-377).

Drawing upon the concepts of "bidirectional updating of representations" (Holyoak & Simon, 1999; Simon, Snow, & Read, 2004) and "the principle of induction" (Glaser, 1978, 1992, 2001; Glaser & Strauss, 1967), Shepherd and Sutcliffe (2011)'s model deals with the way theory comes into view "emerge" via continuous "comparison of comparison conceptual and sensory representations" and is evaluated concerning its possible significance (Shepherd & Sutcliffe, 2011,

p. 367). The result is theorizing that constitutes a new contribution to the literature and spurs further theorizing (Shepherd & Sutcliffe, 2011).

Given the cross-disciplinary nature of research on BI, which extends over a plethora of fields, evolves rapidly, and comprises various types of concepts, technologies, and applications, I adopted an inductive top-down theorizing approach because it aids in revealing or elucidating on a "paradox within or across paradigms" and is particularly suitable when the literature and its concomitant research is cross-disciplinary, immense, consisting of many different and connected parts and sources, and characterized by instant change and progress (Shepherd & Sutcliffe, 2011). This form of theorizing is most suitable for discovering, explaining, and settling paradoxes permeating an extensive and complex body of literature that exceeds the ability of any theorist to realize and understand, as BI does (Shepherd & Sutcliffe, 2011).

I choose to follow the inductive top-down theorizing approach for two reasons. First, it is "consistent with abduction" for it starts with a hypothesis and develops it into theory. Second, "it is informed by the literature, but it is inductive in that it begins with the data from which a theory is built" (Shepherd & Sutcliffe, 2011, p. 362). Here, those data are the scientific articles representing the collective knowledge on BI research of the intellectual communities. Inductive top-down theorizing does not draw from the literature and the accumulated knowledge of theorists to limit the scope of research, but depends on the literature to form comprehensive descriptions—what Shepherd and Sutcliffe (2011) refer to as the gist of tensions, conflicts, or contradictions. Inductive top-down theorizing thus reduces the effect of preconceptions based on inadequate evidence.

Avoiding such preconceptions permits "the data to speak to form a gist", which in turn allows the researcher to pay particular attention to important parts of the literature's "amorphous streams" that denote research avenues and prompt theorizing (Shepherd & Sutcliffe, 2011, p. 363). As such, inductive top-down reasoning does not deal with "data about a phenomenon", but zeroes in on data as depicted in the literature for this latter is the "collective knowledge of the whole intellectual community across time to this point", which rhymes with the idea of "truth as is known today" where truth is the perfect extent of indeterminate inquiry (Shepherd & Sutcliffe, 2011, p. 363; Campbell, 1995).

In this vein, top-down inductive logic differs from classic abduction in the sense that the inquiry about the hypothesis starts from the literature and continues in an iterative process, between the literature and comparison of sensory and conceptual representation, which thus adheres to the rules of abduction to correct itself (Shepherd & Sutcliffe, 2011, p.361). In other words, instead of collecting one

sample from the literature, “and post-hoc locking oneself in a room to fathom a typology”, the top-down approach of theory-building suggests (see, Figure 4) that one “writes out abductive-hypotheses” prior to collecting data, then engages in an “abductive-inductive-deductive cycle…and writes up the findings, while being self-critical and self-reflexive about the deductions…[then repeats the cycle] until [one reaches] some confidence [they have] sampled enough to understand the population” (Boje & Rosile 2020, p.63). By starting with abduction and recording “our intuitive hunches or educated guesses about what interests us regarding the subject of study” and engaging in iterative cycles of sampling and analysis, we thus turn the process of inquiry from “crude induction” to “self-correcting induction” (Boje & Rosile 2020, p.64).

Afterwards, the researcher turns to the literature to determine a sensory representation, which refers to the researcher’s perception of “tensions, oppositions, and/or contradictions among divergent perspectives and explanations of the same phenomena in the literature” (Shepherd & Sutcliffe, 2011, p. 366). This approach is inductive in that it generates constructs and builds abstract accounts of their causal relationships “from the sensory representation into conceptual representations” (Leidner & Tona, 2021, p. 7). My sensory representations are derived from literature examined during four search rounds. For each paper I read, I recorded my perceptions of the many conceptualizations and streams that motivate the literature on BI in a word file. I distilled those notes into common themes, which helped me visualize the need for further search rounds (Leidner & Tona, 2021). Following Shepherd and Sutcliffe (2011), I made repeated use of my sensory representation as I iterated back and forth between my sensory representations and the literature. That literature continued to expand following each search round. Eventually I moved on to conceptual representation as I focused on other elements of the literature that included other conceptualizations of BI, epistemological and theoretical tensions, the antecedents and outcomes of the BI process, or the relationship between strategy and BI or absence thereof. My process of conceptual representation consisted of interpreting my notes on the treatment of the BI–strategy couplet. Here I again iterated through three underpinning roots of this relationship—technological determinism, humanism, and post-humanism—and between my sensory and conceptual representation to delineate the dichotomies and points of rupture in the literature. This iterative process persisted until I re-conceptualized BI as simulacra, drawing from Baudrillard’s and Peirce’s semiotics, and explained the tensions that inhibit taking the notion of BI and its relationship with strategy seriously.

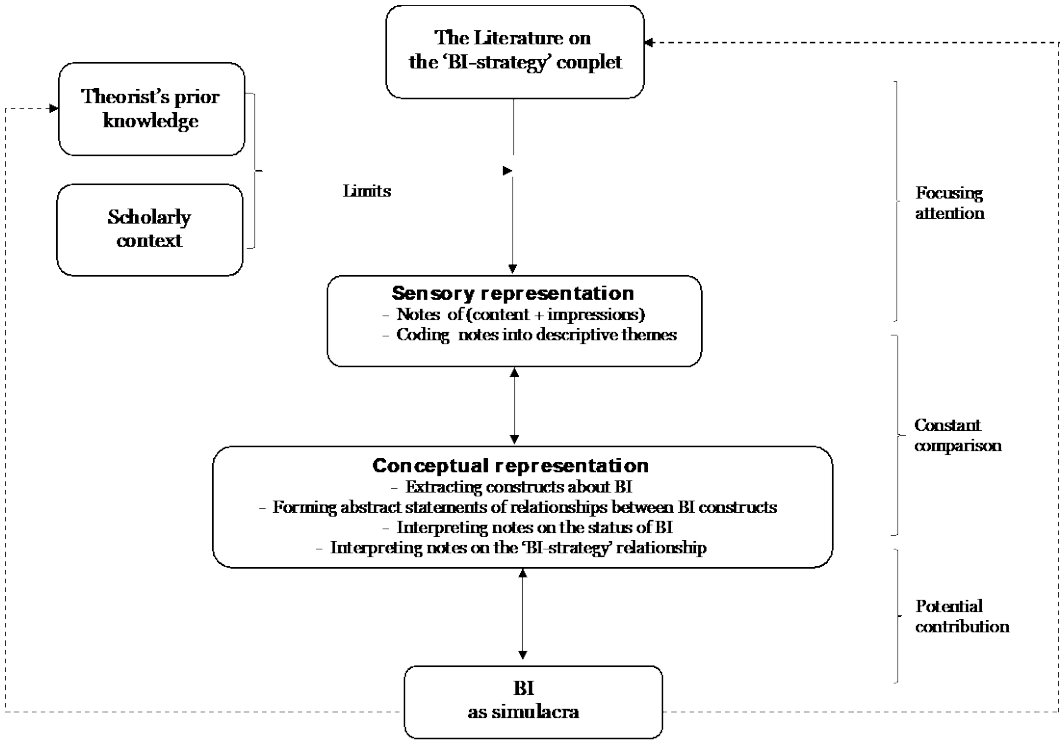

Figure 4. Self-correcting inductive top-down theorizing (adapted from Shepherd & Sutcliffe (2011) and Leidner & Tona (2021)).

3.3 Research strategy

3.3.1 The research process

As a doctoral student in strategic management, I am familiar with Saunders' (2007) research onion that lays down the research process sequentially: the research question directs the method, which itself directs data collection techniques, which in turn yield findings (Neal & Gardens, 2009). At the outset of this research process, I had to choose a method that could help me answer my research question, resonate with the nature of research inquiry that yields knowledge accumulation within my scientific discipline, and fits who I am as a researcher (Nagel et al., 2015).

Concerning the research question, the first round of the review of BI identified the research gap relating to the status of BI and its relationship with strategy. I quickly realized how little theory exists around BI, which makes grounded theory a perfect fit (Neal & Gardens 2009). As far as the research inquiry goes, qualitative research was the perfect fit given the focus on the social practice of strategizing and also

because it is most suitable for research settings where we lack extensive knowledge about a phenomenon and therefore we need qualitative inquiry to support an inductive reasoning that constructs or extends theory (Creswell, 2013; Polit & Beck, 2012; Nagel et al., 2015). Finally, as a researcher, I yearn to interpret social dynamics and their inherent processes, which happen to be what form the basis of BI's link to strategizing. Accordingly, the method used had to be qualitative, reflexive in nature, and offer an outlook into social relations and processes that constitute a phenomenon. The answer was: grounded theory, and specifically its first and second 'inductive-positivist' whorls (Corbin & Strauss, 2008; Glaser & Strauss, 1967), its third 'constructivist' whorl (Charmaz, 2014), and its fourth 'ontological' whorl (Boje, 2018)

The choice of grounded theory is motivated by my primary research objective that seeks to explore the BI–strategy relationship thoroughly. The paucity of research on this topic also informed my choice of grounded theory, which constructs theories grounded in data on previously unexplored phenomena (Coyne & Cowley, 2006; Dunne & Üstűndağ, 2020; Mccann & Clark, 2003). Besides, the nature of my research question also informs my choice of grounded theory, given that I endeavor to construct a theoretical framework that reflects the BI–strategy relationship based on the narratives and stories of the BI scientific communities. As such, grounded theory as a qualitative research approach permits the required flexibility to produce and interpret themes that emerge from the literature (Dunne & Üstűndağ, 2020). Finally, my linguistic and ontological grounds and my personality as a researcher are a good fit with grounded theory (Dunne & Üstűndağ, 2020; Ramalho, Adams, Huggard & Hoare, 2015) and therefore motivates the choice of a methodology that requires the researcher to be able to form concepts and ideas from the data, to withstand uncertainty and a lack of understanding, and accept the return, at any point, to the initial stage of the research process that is termed regression (Glaser, 2010).

3.3.2 The first and second whorls of grounded theory: Glaser and Strauss (1967) and Strauss and Corbin (1994)

Grounded theory has become a prevalent research design among social scientists (Birks & Mills, 2011; Liamputtong, 2009; Whiteside, Mills, & McCalman, 2012) because it allows the systematic documentation of the inductive reasoning of inferring patterns and theories from data and experience (Liamputtong, 2009; Mills, Bonner, & Francis, 2006; Whiteside et al., 2012). Nevertheless, the task of confining grounded theory to any philosophical paradigm is challenging to say the least (Åge, 2011). The method has been criticized by both subjectivists and objectivists writing from opposing poles of the epistemological continuum

(Gustavsson, 1998). With its roots in pragmatism, grounded theory's theoretical foundation lies in symbolic interactionism and social constructivism (Bowers, 1988; Blumer, 1969; Denzin and Lincoln 1994; Mead, 1932; Gardner, McCutcheon, & Fedoruk, 2012). While pragmatism (Blumer, 1969; Mead, 1932) braces symbolic interactionism as an interpretivist approach, subjectivism supports the epistemological stand of constructivist grounded theory that embraces the subjectivity of the researcher and highlights the interrelationship with participants (Gardner et al., 2012; Mills et al., 2006).

This difference in paradigmatic grounding is what explains grounded theory not being a unified framework (Denzin, 2010, p. 296), yet the common denominator of all its versions is three properties: data over hypotheses, data collection is ad infinitum, and research produces theory open to change (Neal & Gardens, 2009). Grounded theory is therefore expected to construct a theory rather than be the theory (Neal & Gardens, 2009). A theory is what has the state of "systems of evolving explanation, personal reflection, orienting principle, epistemological presupposition, developed argument, craft knowledge, and more" (Thomas & James 2008, p. 771). Theory is also capable of producing knowledge in the form of "relevant predictions, explanations, interpretations, and applications" (Glaser & Straus, 1967, p. 1).

All grounded theory practices assign equal importance to data sampling and comparison, and also to formulating theoretical and conceptual elements (Liamputtong, 2009; Whiteside et al., 2012). Studies adopting an inductive research design such as grounded theory do not start with hypotheses formed before the evidence from the data is available. Instead, the researcher's theoretical sensitivity identifies theoretical clues and pointers throughout the process of theoretical sampling. Data are generated via the coding process and aggregated into second and third-order categories and concepts that are constantly contrasted and juxtaposed to identify resemblances and discrepancies (Whiteside et al., 2012; Ezzy,2002; Mills et al., 2006; Glaser & Strauss, 1967; Strauss & Corbin, 1998). This ongoing process of comparing data sits at the heart of theoretical sampling because it allows for new data to emerge and fills gaps in the theory-building relating to features, context, antecedents, and the effects of codes and categories (Charmaz, 2000, 2006; Glaser & Strauss, 1967; Mills et al., 2006; Strauss & Corbin, 1998; Whiteside et al., 2012). The emergence of data and examining those harvested does not cease until each category or concept comprising the theory has reached saturation when no new suggestions surface from primary (Charmaz, 2006; Ezzy, 2002; Whiteside et al., 2012) or secondary datasets. That is the point Glaser (1998) and Glaser and Strauss (1967) deem suitable for the construction of grounded theory.

The attraction of grounded theory lies in the protocol and means (coding, categorization, theoretical sampling, comparison, and memorandum writing). Those aspects provide researchers with the means to ensure their qualitative research is transparent, rigorous, and of high quality (Dunne & Üstűndağ, 2020). It is an inductive framework that attempts to conceptualize theory from within the data rather than from forgoing hypotheses (Charmaz, 2014; Farragher & Coogan, 2018; Glaser & Strauss, 1967; Sebastian 2019) and therefore satisfies research that seeks to provide a theoretical clarification for a particular subject (Sebastian, 2019). The framework is not restricted to any epistemological or ontological assumption but remains a flexible and pure method (Glaser, 2013; Sebastien, 2019) that is "free from ties to any theory of science [or] philosophical conceptions of what is truth" (Bottcher Berthelsen et al., 2017, p. 414).

Grounded theories are thus always interim and arranged according to some interpretations, possibly to be changed or disproved by others, and also subject to the influence of the period in which they were elaborated (Strauss & Corbin, 1994). The combination of those qualities fosters the well-known adaptability and flexibility of grounded theory (Sebastian 2019) required to host various realities like the researcher's own circumstances occurring in "the historical, social, and situation conditions of its production" (Charmaz, 2014; Charmaz, 2017, p. 299; Kean, Salisbury, Rattray, Walsh, Huby & Ramsay, 2016; Sebastian, 2019).

Classic grounded theory insists that patterns and theories should solely emerge from the data without any exposure to the researcher's assumptions or perspectives. Therefore, the researcher is a mere impartial spectator (Glaser & Strauss, 1967; Holton & Walsh, 2017; Sebastian, 2019). However, the newer constructivist grounded theory acknowledges the researcher's experience and knowledge can nourish and expand the research inquiry. Rather than ignore these perspectives, constructivist grounded theory welcomes them on the condition that they do not determine the scope and meaning of the research process and are carefully controlled (Charmaz, 2014; Farragher & Coogan, 2018; Rand, 2013; Sebastian, 2019).

One of the ideas arising from its positivist heritage that still plagues grounded theory is the portrayal of the researcher as a *blank state* (Timonen, Foley, & Conlon, 2018; Urquhart & Fernandez, 2013). Scholars should "ignore the literature of theory and fact on the area under study" (Glaser & Strauss, 1967/2010, p. 37) before approaching data collection (Glaser & Holton, 2004). Doing so entails scholars activating grounded theory without recourse to previous literature and solely privileging the raw data at hand for fear of being influenced by previous theories (Glaser & Strauss, 1967). This requirement seems unrealistic today

(Charmaz, 2014) given modern-day research requirements that oblige researchers to engage with the literature to identify research gaps, positions, and to justify their research inquiries (Conlon, Carney, Timonen, & Scharf, 2015; Foley & Timonen, 2015; Timonen et al., 2018). Neither Glasser nor Strauss oppose literature reviews per se but suggest that researchers abstain from reading the literature on the phenomenon to be explored while recommending reviewing other areas and disciplines (Glaser, 1998). Researchers such as myself—whose subject is cross-disciplinary in nature with somewhat blurry boundaries (Dunne & Üstűndağ, 2020)—are then faced with a conundrum, because we are collecting and analyzing secondary data drawing on Glaser's (2001, p. 145) dictum, "all is data." In response, other scholars maintain grounded theory researchers should have a close relationship with the literature to investigate a subject and determine whether it has been examined and what we know about it. At the same time, researchers are encouraged to reflectively and diligently record their thoughts in writing before, during, and after the review to avoid becoming corrupted by previous theories (Thornberg & Dune, 2019; Dunne & Üstűndağ, 2020; Birks & Mills, 2015).

Although one can still find myths associated with grounded theory (such as that grounded theory coding is time consuming or that grounded theory data collection and analysis must happen simultaneously), research rooted in grounded theory seems to adhere to four core principles regardless of its ontological and epistemological assumptions (Timonen et al., 2018). First, grounded theory research is inductive and therefore not responsive to attempts to verify or disprove it, such as the action of testing hypotheses. Undertaking testing forces researchers to adopt established categories instead of remaining open to categories and their inherent codes emerging from the data (Dunne, 2011; Hallberg, 2010;Timonen et al., 2018). Second, grounded theory can accommodate all types of qualitative data (Glaser & Holton, 2004), whether primary data (e.g., interviews (Timonen et al., 2018), focus group results (Hennick, 2014; Hernandez, 2011), or observations (Laitinen, Kaunonen, & Astedt-Kurki, 2014)), or secondary data (e.g., films, articles, newspapers, novels, and documents (Corbin & Strauss, 2015)). The central concern is to discover and explicate the processes, nature, and conditions of phenomena and their context (Conlon et al., 2015; Timonen et al., 2018). Third, grounded theory is a highly iterative process where the research should display a high level of engagement with data in multiple rounds of analysis and comparison across bits of data (Belfrage & Hauf, 2017; Bryant, 2017; Charmaz, 2014; Corbin & Strauss, 2015; Gibson & Hartman, 2014; Glaser, 2014). The goal is to identify "similarities and differences (variation) between conditions (that is, context) and consequences surrounding key events, incidents, and patterns in the data" (Timonen et al., 2018, p. 7). This constant consideration of the similarities and

dissimilarities in the dataset is what moves the coding forward in a purposeful way; although grounded theorists differ in their opinions on the coding procedure to follow (e.g., Charmaz, 2014; Corbin & Strauss, 2015; Holton & Walsh, 2016). Fourth, although grounded theory does not necessarily yield fully developed theories, its core purpose is to theorize, through what is known as theoretical sampling of concepts emerging from the data to explain all the elements, intricacies, and dimensions of the concepts emerging from the data (Timonen et al., 2018).

Following this notion, theories generated from grounded theory are middle-range theories, in the sense that they are not wide in scope or scale-like grand theories, and nor can they be reduced to hypothesis-like minor theories (Charmaz, 2000; Creswell, 2014; Khanal, 2018). Middle-range theories elucidate a phenomenon in light of various perspectives (Charmaz, 2000; Creswell, 2014; Glaser & Strauss,1967) employing visual coding (Browm, 1993; Creswell, 2014), theoretical propositions (Khanal, 2018), or a written account of connected events and relationships (Strauss & Corbin, 1998).

3.3.3 The third whorl of grounded theory: Charmaz (2006; 2008)

Grounded theory has always been postmodern (Apramian, Cristancho, Watling, & Lingard, 2016; Clarke et al., 2005), however six decades since Strauss and Corbin (1967; amended 1990) introduced their classic grounded theory approach to join the interpretivist and postmodern methodologies (Gardner et al, 2012), their contemporary grounded theory (Fedoruk 1999) is still "known for … its positivistic assumptions" (Charmaz 2006, p. 9) as opposed to Charmaz's constructivist approach that "…[frees] the method from its positivist roots …and moves it into interpretive inquiry" Charmaz (2008, p. 133). Kathy Charmaz's constructivist grounded theory (1995; 2006) is best suited for research concerned with "social reality and how that reality is known," how its associated meaning is constructed, as well as how actors involved in this meaning-making interpret reality (Suddaby, 2006, p. 634). The theory emphasizes flexible data collection and analysis (Creswell, 2008; Gardner et al., 2012) by "creating abstract interpretive understandings of the data" (Charmaz 2006, p. 9). Constructivist grounded theory also grants active agency to the researcher who occupies the role of a "passionate participant" (Lincoln and Guba 2000, p. 166) carefully following the contributions of all participants and guaranteeing the "co-construction of a theory of the social phenomena" (Gardner et al., 2012, p. 68).

Under constructivist grounded theory, the researcher becomes involved in a research process that is not concerned with mirroring the reality of a phenomenon

as much as it is interested in the social construction of knowledge "through a dialectical understanding of the phenomenon" (Khanal, 2018, p. 6; Charmaz, 2016). As a consequence, the researcher becomes a part of the world they are inquiring about and the data they gather. Consequently, the researcher constructs a theory utilizing a certain mutuality between themselves and their past and the contributions, opinions, or practices of participants (Gardner et al., 2012). Charmaz (2008, p. 133) points out that "entering the phenomenon shrinks the distance between the viewer and the viewed. Subsequently, we might better understand our research multiple realities and standpoints."

Constructivist grounded theory recognizes the existence of an "interaction between the 'viewer' (researcher) and the 'viewed' (the subject of the research)" (Farragher & Coogan, 2018, p.5; see also Lian, 2016; Martin & Barnard, 2013; Sebastian 2019). As such, it maintains the two key premises of classic grounded theory (Glaser & Strauss, 1967); namely its interpretative and iterative process of joining theory and research (Sebastian 2019; Charmaz, 2014) and the constant comparative analysis "directing the collection and analysis of data in tandem with theoretical sampling as a means of guiding the direction of further data sampling" (Holton & Walsh, 2017, p. 34). It therefore allows for the construction of themes from the data that substantiate the theoretical understanding of the topic (Sebastian 2019).

The positivistic classic grounded theory insists that the researcher identifies theory from the data and therefore presumes an objective reality that is out there waiting to be discovered by an unbiased researcher (Charmaz, 2006; Dunne & Üstűndağ, 2020;). Constructivist grounded theory, however, emphasizes researchers' subjectivity in their activity to co-construct theory, which implies that the discovered theories would be informed by their view of reality (Dunne & Üstűndağ, 2020; Thornberg & Dune, 2019). This situation might raise questions of bias and the rigor of findings. Those questions might be addressed by the reflexive behavior of the researcher vis-à-vis their part in the process of data collection and analysis and theory discovery (Dunne & Üstűndağ, 2020).

This thesis falls within the boundaries of reflexive and subjectivist postmodernism. It assumes that the concept of truth is fathomed within a broader contextual scope that factors in the idea of time, space, and culture (Charmaz, 2006; Gardner et al., 2012). Similarly, the constructivist view of grounded theory rejects the state of having an objective reality. Instead, the view assumes a postmodern epistemology that entails the researcher discovering and interpreting reality (Gardner et al., 2012) that "arises from the interactive process and its temporal, cultural, and structural contexts" (Charmaz, 2000, p.523). This process is social constructivism,

through which we perceive and make sense of our world, and that gives rise to our being, society, and reality. Therefore constructivist grounded theory allows the researcher to avail of the proper research approach to tap into the mechanics and dynamics of social interactions, social structures, shared social reality, and meaning-making (Gardner et al., 2010).

Postmodernism permeates Charmaz's (1995) account of her constructivist grounded theory (Clarke 2003; Gardner et al., 2012; Mills et al., 2007). Accordingly, that theory was adopted to inform the results of this thesis as I analyzed the data and generated codes and themes (Glaser & Strauss, 1967). Moreover, the reflexive account of this thesis fits Charmaz's (2006) constructivist grounded theory in that it allows my interpretations to be combined with the narratives and views from the literature to develop a grounded theory that is not confined to the very narrow definition of notion theory as a supposition intended to explain *x*, but, instead, sought to reveal the interpretative character that opens up a phenomenon to our interpretation skills and helps us understand it and make meaning out of it (Charmaz, 2006; Gardner et al., 2012). In constructivist grounded theory, coding is "the pivotal link between collecting data and developing an emergent theory to explain these data and define what is happening in the data and begin to grapple with what it means" (Charmaz, 2006, p. 46). As such, the theory that emerges from this thesis is grounded in the data "when theoretical sampling reached a point of saturation resulting from reflection and revisiting the theory and thus refining it" (Bakar, 2015, p. 25).

3.3.4 The fourth whorl of grounded theory: Boje (2018)

The three whorls of grounded theory are techniques of knowing that are separated from "being-in-the world" (Boje, 2018), which means they discard the existence of our ontological status and that of others in time, space, and matter (Dreyfus, 1991) in order to develop grounded theories rooted in positivist ontology that objectifies the inductive process of inquiry (Boje, 2018). This state of affairs maintains the "(inter)subjectivity-objectivity" dualism (Boje, 2018) and yields a "disembodied organization research" (Boje, 2018, p.7) that hastily develops and turns inductive inferences into general categories. Accordingly, the three waves of grounded theory are without significant theoretical anchoring and therefore lack the basis for developing theory (Boje, 2018). Below, I discuss the fallacies of each of these three whorls.

The 'inductive epistemic fallacy' of the first wave (1967-1993) is caused by its focus on the inductive theoretical uncovering from data, gathered following a systematic process of research (Glaser and Strauss, 1967) to bring about theoretical

hypotheses based on the qualitative method, without testing or verifying how these inductive propositions come out to be in a practical and historical context (Boje, 2018). This mode of theory generation (Glaser & Strauss, (1967) draws from Merton's conceptualization of ground as a social activity that is not based or concerned with theory, yet out of which theory can be derived (Boje, 2018). In this regard, the first wave of grounded theory joins inductive reasoning to Cartesian "spectatorial account of knowledge" (Rorty, 2010, p. 74) and crowns our "sensory impressions" (Dewey, 1929, p. 98) as the final stage in inductive theorizing, which in turn yields a sense-making epistemology (Boje, 2018; Rorty, 2010). However, sensory impressions, and by extension sense-making, are not always adequate because "reflective inquiry is valid only as it reproduces the work previously affected by constitutive thought. The goal of human thinking is approximation to the reality already instituted by absolute reason" (Dewey, 1929, p.98). Therefore, inductive reasoning refers to every process whereby data observation and collection "are regulated with a view to facilitating the formation of explanatory conceptions and theories" (Dewey, 1910, p. 86). Induction is not a "whole" in itself, but, rather, must continue into "deductive devices" to grasp and understand "individual cases" (Dewey, 2010, p. 99) because the aim of "inductive inference" to gather, compare, and contrast "a number of like cases… is a secondary development within the process of securing a correct conclusion in some single case." It is therefore a secondary development because it succumbs to what Boje (2018, p. 4) term "the black swan" fallacy, that is, when scholars engage in gathering specific cases to validate the inference that "all swans are white" which then crumbles as soon as someone somewhere discovers the black swan.

To resolve the pegged 'inductive fallacy' of the first wave, the second wave of grounded theory (1994-2004) resorts to hermeneutics to imply the reciprocity of theory and practice (Strauss & Corbin, 1994). It also turns to positivistic coding of qualitative data to obtain deductive generalizations that overlook situational experience and meaning-making (Suddaby, 2006; Boje, 2018). The second wave of grounded theory seeks to explore human encounters with facts or events in a thorough and iterative procedure that grounds the researcher in the data and develops a comprehensive view of a subject by unpacking various themes from the text using open coding. The process enables later comparisons and defining linkages and relationships across them in theoretical structures (Agar, 1996; Ryan & Bernard, 2000; Bernard, 1994; Bogdan & Biklen, 1992; Lincoln & Guba, 1985; Lofland & Lofland, 1995; Strauss & Corbin, 1990; Taylor & Bogdan, 1984). However, this turn to deduction still overlooks the way it affects how meaning emerges (Boje, 2018) because "the control of the origin and development of hypotheses by deduction does not cease, however, with locating the problem. Ideas

as they first present themselves are inchoate and incomplete. Deduction is their elaboration into fullness and completeness of meaning" (Dewey, 1910, p. 94).

The third wave (2005-2017) uses social constructivism to break with falsification and to base induction upon reliable "published work of authority" without doing away with positivistic coding (Boje, 2018, p. 5). In this regard, the work of Charmaz (2008), Clark (2005), and Mills et al. (2008) breaks with "symbolic interactionism" and nurtured a fascination with grounding inductive inferences in authorities' scientific contributions as opposed to falsification (Annells, 1996; Boje, 2018). However, this penchant for placing "the common received opinions, either of our friends or party, neighborhood or country" (Dewey, 1910, p. 25) center stage is risky. That is because "beginning with definitions, rules, general principles, classifications, and the like, is a common form of the first error … the mistake is, logically, due to the attempt to introduce deductive considerations without first making acquaintance with the particular facts that create a need for the generalizing rational devices" Dewey (1910, pp. 98-99). In sum, the three waves of grounded theory rely upon a positivistic ontology to pursue inductive research, creating a dualistic relationship between intersubjectivity and objectivity and yielding an ontology separated from 'being-in-the world' (Boje, 2018). In response, this thesis makes a grounded theory shift to ontology to avoid the "inductive epistemic fallacy," associated with the first whorls of grounded theory, which reduces "ontological concerns of being into inductive-epistemological inference about knowing" (Boje, 2018, pp. 25-35). This turn to ontology is possible via the fourth whorl of grounded theory that accords due importance to context and investigates "embodied existence," and the socio-material entanglement of the human and the material (Boje, 2018, p.6; Boje & Rosile, 2020) and thereby avoids the fallacies and the shortcomings of the first three waves.

The fourth whorl of grounded theory is achieved through a reflective and reflexive reasoning that has at its core: "a double movement…from the given partial and confused data to a suggested comprehensive (or inclusive) entire situation; and back from this suggested whole—which as suggested is a meaning, an idea—to the particular facts, so as to connect these with one another and with additional facts to which the suggestion has directed attention. Roughly speaking, the first of these movements is inductive; the second deductive. A complete act of thought involves both—it involves, that is, a fruitful interaction of observed (or recollected) particular considerations and of inclusive and far-reaching (general) meanings" (Dewey, 1910, pp. 79-80). The fourth wave of grounded theory is thus a reflective and reflexive form of thinking that goes in tandem with a continuous search and exploration of "new materials to corroborate or to refute the first suggestions that occur…Reflective thinking is always more or less troublesome because it involves

overcoming the inertia that inclines one to accept suggestions at their face value; it involves willingness to endure a condition of mental unrest and disturbance. Reflective thinking, in short, means judgment suspended during further inquiry; and suspense is likely to be somewhat painful" (Dewey, 1910, p. 13).

The fourth whorl of grounded theory is a turn toward an ontological exploration of the meaning of human, material, and most importantly "being" because "without meaning, things are nothing but blind stimuli or chance sources of pleasure and pain; and since meanings are not themselves tangible things, they must be anchored by attachment to some physical existence" (Dewey, 1910, p. 171). As such, the 4th wave of grounded theory seeks to dismantle Cartesian distinction of mind and body and its pegged dialectic problem "by avoiding both the crudity and paradox of materialism and the 'unscientific' theorizing offered by traditional dualisms" (Rorty, 2010, p. 80). It, therefore, shifts our scientific inquiries from the confines of linguistic objectification that "discriminates and identifies… the qualities of organic action, which are feelings are pains, pleasures, doors, noises, tones, only potentially and proleptically, [in order to objectify them] as traits of things" (Dewey 1925, p. 258-259).

Therefore, this thesis supplements the first three waves of grounded theory, upon which it bases essays 1 through 5, with the fourth whorl of grounded theory to make up for the missing gist of the first three whorls to build theory and bring the ontological basis of BI, and its relationship with strategy work, center stage, and also t focus on contextual relations and processes and pursue the topics of materiality and embodiment (Boje, 2018; Gephart, 1978; 1988). The fourth whorl of grounded theory is based upon Peirce's semiotics to adhere to the inter-subjectivist paradigm of inquiry (Boje, 2018; Boje & Rosile, 2020) to "minimize the possibly one-sided nature of descriptive accounts" (Gephart, 1978, p. 562). As Rorty (2010, p. 152) puts it, "Philosophers working after 'the linguistic turn' still have great deal to learn about experience and language from Peirce' semiotics" because it can overcome the epistemic fallacy that characterizes the three waves of grounded theory (epistemological, positivistic coding, social constructivist). It can therefore begin the fourth whorl of grounded theory with a turn to ontology (Boje, 2018) that complements new materialists (Bennett, 2009; 2010; Barad, 2007) post-humanism, that theorizes the material as vital and agentic and deprives the human from its centrality in the being of life, and thereby erects the foundation to a post-humanist ontology that theorizes the material and human as part of semiotics, which in turn grants agency to both the human and the material for both are signs in a semiotic life.

Accordingly, this thesis adopts a Peircean-based fourth whorl of grounded theory to escape the scenario where the author will generate inductive inferences without questioning or interrogating its validity by means of Peircean abductive inference that supplement the first waves of grounded theory with a "relational process ontology" (Boje, 2018, p.7). As such, a Peircean-based 4th whorl grounded theory will not derive direct generalizations out of the sample, but instead will continue the process of gathering a sample where one can identify the black swan that challenges the generalization that all birds are white swans (Boje, 2018). As the father of American pragmatism puts it: "The operation of testing a hypothesis by experiment, which consists in remarking that, if it is true, observations made under certain conditions ought to have certain results, and then causing those conditions to be fulfilled, and noting the results, and, if they are favorable, extending a certain confidence to the hypothesis, I call induction" (Peirce, Buchler, 1955, p. 152).

Accordingly, a Peircean-based fourth whorl grounded theory would conduct sampling not to derive inductive conclusions but examine the veracity of the conclusions because "all induction whatever may be regarded as the inference that throughout a whole class a ration will have about the same value that it has in a random sample of that class, provided the nature of the ration for which the sample is to be examined in specified in advance of the examination" (Peirce, Buchler, 1955, p. 152). Under Peirce, the conclusion that "all birds are white swans" is challenged with what Peirce terms "abductive inference (Peirce, Buchler, 1955, p. 304), which corroborates the "guess-work" of induction with the "retroductive reasoning" (Boje, 2018) of abduction under which "it can never be justifiable to accept the hypothesis otherwise than as an interrogation. But as long as that condition is observed, no positive falsity is to be feared. Therefore the whole question of which one of several plausible hypotheses ought to be entertained becomes purely a question of economy" (Peirce, Buchler, 1955, p. 154). By so doing, Peirce bring to the fourth wave of grounded theory a solution to the epistemic and inductive fallacy for it allows grounded theory to shift to ontology and thereby theorize causality and agency far from the mechanistic and dualistic Cartesian logic, then it grants induction a way to trace the process of developing conclusions and verifies their validity (Boje, 2018).

Such a solution is called "Peirce's self-correcting series of 'fair samples' to verify inferences" (Boje, 2018, p.10). Applying the solution involves "taking [a series] fair samples from a larger totality," verifying the conclusions of each sample against the following sample, which eventually leads to "the constant tendency of the inductive process to correct itself" (Peirce, 1958: Vol. 2, p. 445). In the context of this dissertation, that involves taking four series of samples from the population of

body of knowledge on BI, its associated terms, its nature as thing or material, and its relationship with strategy. These four series of sampling allowed the author to make predictions each time, record conclusions, verify them against the successive sample, and "adjust as he went on" (Boje, 2018, p.14) and step back to see the "process of correction" reaches "the true proportion" (Wright, 1941/1965, p.160) out of which a certain and "generalizable solution" emerges (Boje, 2018, p.14). As such, Peirce's "self-correcting process" of series (Wright, 1941/1965, p.160) differentiates the 4th whorl of grounded theory from the first three whorls that focus on in-depth scrutinizing of one sample through "content analysis, analytic notes, or cross coding for cases comparison," which in turn brings to fore the inherent epistemic and positivistic fallacies (Boje, 2018, p.11).

3.4 Data collection and analysis

3.4.1 Sampling

Based on the way research in the field of management is traditionally done or believed, qualitative research is affiliated with grounded theory (Glaser & Strauss, 1967)'s inductive reasoning to build theory from conceptual categories that emerge from sets of collected data (Plakoyiannaki & Budhwar 2021). Theorizing from qualitative inquiry commences with sampling; that is not to be conflated with the positivistic view that implies a decision on data sources, site, and participants at the outset of the research process, which in turn assumes a static view of the phenomenon and ignores its inherent dynamic and temporal qualities (Plakoyiannaki & Budhwar 2021). Conversely, sampling for qualitative research attends to the question of why the subject matter (along with its associated context) needs examination? As such, sampling adopts an emergent and adaptive tone which "assumes that the course of the study cannot be charted in advance [because] key phenomena become progressively crystallized as the investigation unfolds" (Plakoyiannaki & Budhwar 2021, p. 4). Therefore, researchers learn more about the phenomena as their inquiry into them develop over time (Plakoyiannaki & Budhwar 2021).

A precondition of qualitative research is the possibility of obtaining and scrutinizing empirical data. Such data can be classified into four quadrants based on data source and type to distinguish between "linguistic, non-linguistic, reactive and non-reactive data" (Howarth, 2005, p. 335). This thesis is a non-reactive linguistic data-based qualitative study that describes and analyzes ideas, theories, and frameworks in context (Alavi et al., 1989). The choice of non-reactive linguistic data was influenced by the nature of the scientific field of BI, which is cross-

disciplinary and in constant flux. The field is also characterized by a conceptual and theoretical treatment of BI that is still embryonic and therefore necessitates theory-building rather than testing (Alavi et al., 1989; Chen & Hirschheim, 2004). In fact, in classical reviews of information system research, non-reactive qualitative studies comprise around 40% of research methodologies (Alavi et al., 1989; Cash & Nunamaker 1989, 1990, 1991; Chen & Hirschheim, 2004; Farhoomand & Drury, 1999; Galliers, 1991; Galliers & Land,1987; Orlikowski & Baroudi, 1991). Therefore, to examine the construction of BI scientific discourse, I consider the text of each scientific article as a narrative (Bazerman, 1988; Latour & Woolgar, 1986; Rouse, 1990)and as linguistic and non-reactive data (Howarth, 2005), which allows me to deconstruct its underpinning meta-theoretical assumptions and move beyond the outer rim they form (Grandy & Mills; Pollner, 1991).

Data were collected in four stages. The first stage was conducted in the winter of 2017. I collected and analyzed articles published in the Academic Journal Guide levels 3 and 4 ranked journals to capture the definitions and the dimensions of the BI process. Following an initial perusal, I extended the data collection between the winter and the fall of 2018 to the entirety of the Academic Journal Guide to account for the theoretical assumptions of all research communities that influence BI literature. The third stage extended the BI terms to include big data and modified the sample selection to account for the linkage between BI and strategizing and occurred between the fall of 2019 and fall of 2020. During this period, I also conducted a fourth search round to encompass BI materiality and uncover its theorizing and linkage to the strategy research. This repeated research procedure and design is pertinent to this thesis for its emphasis on the time frame can allow for a richer sketch of the phenomenon at hand (Chen & Hirschheim, 2004). Each search round followed its own systematic search protocol based on its keywords derived from previous literature reviews and from articles that addressed BI as a concept, or its linkage, and that of any of its related terms, with strategizing. Table 2 and figure 5 provide an illustrative example of the process whereby keywords were derived and concatenated to form search strings that were inserted into scientific databases (e.g., Scopus, ABI inform, EBSCO, etc), and the systematic search process I followed to narrow the sample from database hits to the final sample following inclusion and exclusion criteria that emanated from the research question of each essay (e.g., How is BI conceptualized? How is BI and strategizing depicted as a relational couplet? How does the relationship between strategizing and BI contribute to the emergence of the doings of strategy?). Although these criteria limit the sample, they were necessary as the search on BI and its related terms generated over 110,000 hits (MacKay & Zundel, 2017).

The inclusion criterion of relevance varied according to the research question. I read the articles' abstracts, introductions, and reference lists to elicit other contributions (Lee, 2009). The quality inclusion criterion ensured that only articles published in one of the 1582 Academic Journal Guide ranked journals were included in the sample. The Academic Journal Guide offers an extensive cross-disciplinary list subject to documented hybrid verification and an iterative ranking process based upon peer reviews, peers' consensus, and citations (Mingers & Willcocks, 2017; Morris, Harvey, & Kelly, 2009). Therefore, the set serves as a credible guide to the quality standard necessary to develop a high-quality inquiry into the BI literature (Macpherson & Jones, 2010; Rousseau et al., 2008). Initially, I selected the year 1995 as the starting point of the search process. The decision follows the guidance of Chen et al. (2012) who use the same year to mark the start of what they refer to as the business intelligence and applications 1.0 period. That was when the analytical technique of BI and applications, data marts, and relational database management systems became popular (Chen et al., 2012). However, as I read the articles and performed a backward search, I moved the starting point back to 1990 because other scholars referred to it as the inception of BI (Davenport et al., 2001). Eventually, the starting year of the sample expanded to 1985 to include seminal works published prior to 1990 covering the topics of environmental scanning and decision support systems. Similarly, the keywords also expanded throughout the search process to account for changes in the BI landscape and capture the big data term, and therefore, the third stage of the search views big data as part of the BI and analytics literature (Chen et al., 2012; Lavalle et al., 2011; McAfee & Brynjolfsson, 2012).

Table 2. Exemplary illustration of how keywords were derived based on previous reviews

Focus	Authors	Contribution	Data source. Sample. Timeframe
Big data	Roden et al. (2017)	Big data and operations models.	Scopus. 200 articles. Time frame undisclosed.
	Sivarajah et al. (2017)	Big data challenges.	Scopus database. 227 articles. 1996-2015.
	Gupta et al. (2017)	Big data & humanitarian supply chain.	Scopus database. 28 articles. Time frame undisclosed.
	Muller & Jensen (2017)	Big data and value creation.	Scopus and Web of Science. 30 articles. 2010-2015.
	Wamba et al. (2015)	Big data and value creation.	Various databases. 62 articles. 2006-2012
	Mikalef et al. (2017)	Big data and competitive performance.	Various databases.. 84 papers. 2010 to 2017.
	Wang et al. (2016)	Big data and supply chain analytics.	Various databases.. 101 articles. 2004-2014.
Business Intelligence	Sharma et al. (2014)	Business analytics and value.	Undisclosed.
	Trieu (2017)	Business intelligence and value.	Various databases. 106 articles.2000-2015.
	Watson (2009)	BI evolution.	Undisclosed.
	Jourdan (2008)	BI research.	ABI/INFORM database. 167 articles. 1997 to 2006.
	Bose (2009)	BI analytics framework.	Undisclosed.
	Holsapple et al. (2014)	Six dimensions of business analytics.	Undisclosed.
	Harrison et al. (2015)	Internal BI system success.	Undisclosed.
	Bacic & Fadlalla (2016)	Visual IQ-based BIV framework.	Undisclosed.
	Chen et al. (2012)	The evolution of BI & A.	Undisclosed. 3602 articles. 2000-2011.
	Moro et al. (2015)	Business intelligence in banking.	14 journals. 219 articles. 2002-2013.
Competitive intelligence	Calof & Wright (2008)	CI evolution.	ABI Inform Proquest. 168 articles. 1965 to 2007.
	Du toit (2015)	Evolution CI as an academic field.	ABI inform database. 338 articles. 1994 to 2014.
	Rouach & Santi (2001)	CI scope.	Undisclosed.
	Arnott & Pervan (2014)	DSS research.	16 journals. 1466 articles. 1990 to 2010.

Focus	Authors	Contribution	Data source. Sample. Timeframe
Decision support systems	Arnott & Pervan (2005)	The state of DSS research.	14 journals. 1020 articles. 1990 to 2003.
	Arnott & Pervan (2008)	Eight key issues for DSS field.	1990 to 2004. 1093 articles. 14 journals.
	Hosac et al. (2002)	DSS research.	Undisclosed.
	Mora et al. (2005)	A strategic assessment of intelligent DSS.	Various databases. 398 articles. 1980-2004.
	Khoong (1995)	A new DSS research agenda.	Undisclosed
	Shim et al. (2002)	The DSS decision-making process.	Undisclosed
	Eom & Kim (2006)	DSS applications.	Various databases. 210 articles. 1995-2001.
	Tako & Robinson (2012)	DSS modeling tools.	Various databases.127 articles. 1996 to 2006.
	Eom (1996)	6 major areas of DSS intellectual field.	82 journals. 944 articles. 1971-1993.
	Eom (1998)	4 emerging areas of the DSS discipline.	40 journals. 498 articles. 1991-1995.
	Eom (2016)	Four major areas of DSS applications.	ABI/INFORM database. 80 articles. 2002-2012.
	Arnott & Pervan (2012)	5 issues of DSS design science research.	14 journals. 1167 articles. 1990-2005.
Environmental scanning	Robinson et al. (2020)	A new typology of 5 ES research.	Various databases.132 articles. 1970 to 2017.
	Okumus (2004)	Ten challenges of ES in hospitality.	31 articles. Undisclosed time frame & sample.
"big data analy*" AND strategizing"	Article at hand	'big data analytics–strategizing' relationship	200 articles. Scopus. All ABS journals. 1995 to 2020

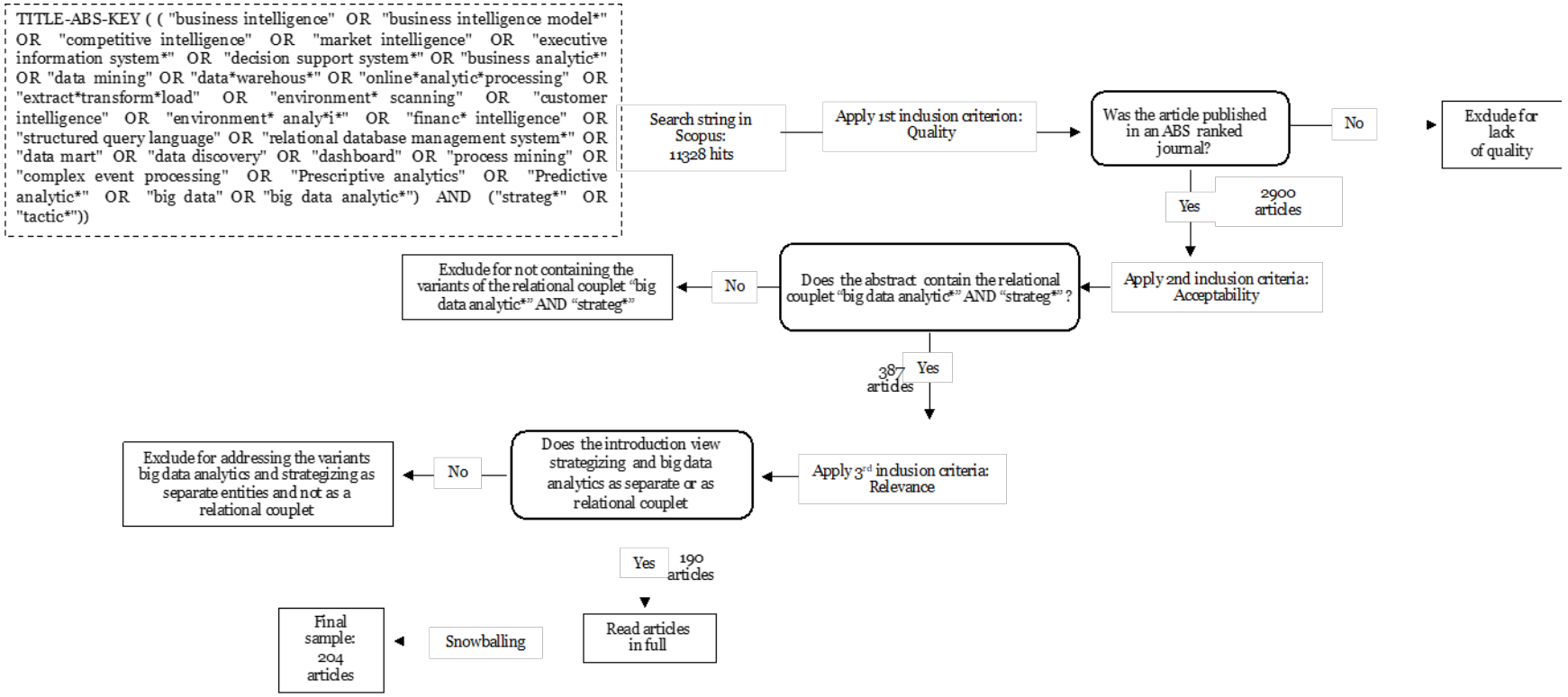

Figure 5. Exemplary illustration of how systematic search process of the literature was conducte

As a result, the dissertation seeks to encompass the progress of BI in the past four decades by including the term BI to account for the analytical component of business intelligence and all related terms appearing in the 2000s (Chen, Chiang, & Storey, 2012). This conceptualization also includes big data and analytics to account for analytical techniques for large and complex data and the associated terms and technologies for storage, probing, and dissemination (Chen et al., 2012). This dissertation uses BI as a unified term encompassing its applications and big data analytics (Chen et al., 2012) to refer to all the analytics technologies based on data mining and prescriptive and descriptive analysis, data warehousing, extract-transform-load (ETL), and online analytical processing technologies (OLAP) (Chaudhuri, Dayal, & Narasayya, 2011; Chen et al., 2012).

3.4.2 Coding

Each revised article sample required determining the themes and categories dominating its textual literature created and sustained within the BI cross-disciplinary community of researchers; a task that required reducing the complexity of the textual corpora of the articles to derive the thematic lines that motivate the discussions of BI and its relationship with strategy. The varied frame of textual analysis allows for reliance on statistical methods to analyze primary studies (Cooper 1998; Whittemore & Knafl, 2005) or qualitative approaches (metasynthesis, meta-studies, narrative analysis, grounded theory) to integrate evidence in theoretical frameworks and derive conclusions in the form of new conceptualizations or suggestions (Whittemore & Knafl, 2005; Jensen & Allen 1996, Sandelowski et al., 1997, Kearney 1998, Paterson et al., 2001, Sandelowski & Barroso 2003).

This thesis follows the stream of studies that apply the notion of narrative to scientific articles (e.g., Bazerman, 1988; Knorr-Cetina, 1981; Latour, 1987; Luoto et al., 2017; Rhodes & Brown, 2005). Scientific texts represent the arrangement of events that build a common narrative of a scientific community on certain phenomena (Gross et al., 2002; Holmes, 1989; Luoto et al., 2017;). Scientific articles as narratives is a notion that is common in the fields of sociology, anthropology, archaeology, history, and linguistics that draw from Saussure's structuralism (e.g., de Waard, 2010; Dahlstrom, 2010; Gooding, 1990; MacCormac, 1976; Sheehan & Rode, 1999; Verene, 1993), or Deleuze, Baudrillard, and Derrida's poststructuralism (e.g., Knorr-Cetina, 1981; Latour, 1987). Therefore, qualitative data in the context of this thesis are text and narratives on the story of BI and strategy found in the textual content of scientific articles. Qualitative data for the most part is free-flowing text that can be reduced to codes

by way of grounded theory and analytical induction and abduction (Ryan & Bernard, 2000), along with other techniques that this thesis has incorporated to elicit the maximum from the text. As a proxy for experience, the text was first subjected to Latent Dirichlet Allocation (LDA) to generate all motifs in each scientific article and estimate the strength of each motif within each document (Blei & Lafferty, 2009; Blei, 2012; Blei et al., 2003; DiMaggio et al., 2013). Next the author conducted co-citation analysis to reduce the text to "the fundamental meanings of specific words" and discern patterns from relationships among citations and topics to compare and juxtapose across the textual body (Ryan & Bernard, 2000, p. 779).

However, the structures produced deprive words and citations of their contexts and explore their linkages as independent entities, and thus may dilute implicit meanings and fail to capture the text's subtle nuances (Ryan & Bernard, 2000, p. 779). This shortcoming was addressed by subjecting the text to in-depth and iterative coding to analyze each text in its entirety and inductively and abductively uncover themes and construct theoretical models (Ryan & Bernard, 2000). In this project, coding as a content analysis strategy started by identifying the BI body of text and choosing entire texts as units of analysis (Krippendorf, 1980; Tesch, 1990; Ryan & Bernard, 2000). The four whorls of grounded theory suggest inducing "thematic units" (Krippendorf, 1980) through careful scrutiny of each line of text with an eye for different notions, assumptions, processes, dimensions, mechanisms, antecedents, and outcomes (Ryan & Bernard, 2000). The process involves significant iterative analysis before the common themes are refined across a literature corpus. The process accords with Miles and Huberman's statement that "coding is analysis" (1994, p. 56).

In grounded theory terms, the analysis of data begins with coding, that is, becoming familiar with the data and synthesizing it (Charmaz, 2014, Khanal, 2018). This process also entails naming each piece of data, according to its status and meaning, with a code that denotes process, attribute, or dimension (Khanal, 2018). These codes are then grouped in umbrella categories that are further scrutinized and integrated in light of more data that is again coded and categorized in an ad infinitum process involving data collection and analysis, which ultimately leads to generating and verifying conclusion (Charmaz, 2014; Khanal, 2018; Boje & Rosile, 2020). This coding process paves the way for the "analytical story [toward] a theoretical direction" (Charmaz, 2006, p. 63; 2014) that "constructs a rendering of the worlds we study rather than an external reporting of events and statements" (Charmaz, 2014, p. 339). The research strategy of this thesis entailed closely reading each article in each round of the systematic search to identify common patterns and thematic ideas (Gibbs, 2007; Oriola, 2020) that validate or

falsify previous conclusions (regarding the state of affairs, the background, interest, focus, premises and taken for granted assumptions of scholars vis-à-vis BI and its relationship with strategy) and thereby yielding a subsequent search following Peirce's self-correcting series of 'fair samples' (Boje, 2018; Boje & Rosile, 2020).

The scientific literature was read in various rounds of critical reading following Eco's (1994) guidelines to uncover (a) the world where the story takes place (Truby, 2007), and (b) the actors that drive the story and the present and omitted voices in the story (Luoto, 2017). Another reading focused on persuasion strategies (Riessman, 2005) was undertaken to unpack rhetorical and discursive devices across the themes and narratives of the articles (Luoto et al, 2017; Shepherd & Challenger, 2013; Suddaby & Greenwood, 2005; van Leeuwen & Wodak, 1999). The paradigmatic mapping followed a problematization technique devised by Alvesson and Sandberg (2011) to "identify, articulate, and challenge underlying assumptions of the existing literature" (p. 248). In doing the four whorls of grounded theory, I endeavored to emphasize the particular relation between the human and BI, and therefore to form emergent conceptualizations of the two elements of this relationship into integrated patterns. That was achieved through the steps of the four whorls of grounded theory woven together by Peirce's self-correcting series of 'fair samples' (Boje, 2018; Boje & Rosile, 2020) and the constant comparative method that seeks to discover concepts from all data (Glaser, 2002). Figures 6, 7, and 8 and Table 3 offer some illustrative examples of the coding of patterns and deconstruction of themes for the seven essays that make up this dissertation.

	B-I	B-II	B-III	C-I	C-II	C-III	C-IV
A-I	87,27,07,52, 71,59,68,08, 47,119, 78	04,	62, 95,108, 98				26,47
A-II	08,52,111, 43, 47,65,117	04,85,21,	25, 91, 95, 98, 102,106, 120, 113, 93,				45,26,47
A-III	41,08,70,110, 84 34,43,73,65, 104,	85,	92, 96, 116, 115,				45,26,47, 21
B-I	37,72,77,32,67,24, 64, 60,08,111,09, 63,30,36, 19, 48, 16,14,10,18,22,02, 01,54,12,29, 56, 42,86,105,117,119			55, 33,19, 18	110, 86,28, 10, 18,26,19, 40, 34,06, 105	58, 03,10,19, 104	66,17, 47 46
B-II		20,49,39,31,76,57,38, 44, 74,13, 11, 69,		35	51,75,	50,53,23,	21,51,
B-III			25,83,80,82,94,114 , 116, 120	05,82, 91, 95, 108, 113,92, 98	15,82, 89, 90, 99, 100, 101, 102, 103, 109, 112, 114, 116, 115, 25, 93, 108	62,79, 82, 96, 88,107, 109	62,88, 97,100, 120, 118,
C-I	61, 52						
C-II	07,81						
C-III							
C-IV					45		47

A-I: Environmental Factors | A-II: Organizational Factors | A-III: Managers/ Individual Factors | B-I: Collection | B-II: Transformation | B-III: Usage

C-I: Strategic Outcomes | C-II: Firm performance | C-III: Decision Making | C-IV: Organizational Intelligence

Figure 6. Exemplary illustration of how linkages and patterns across the literature were uncovered

Table 3. Exemplary illustration of how linkages and patterns across the literature were uncovered

No	Author(s)	Discipline	Industry Firm Characteristic Region	Sample Size Method	Linkage(s)	Key findings
1	Calof & Wright (2008)	Marketing International Business	_____	Bibliometric assessment	B-I—B-I	Intelligence collection draws from the environmental scanning and strategic management fields.
2	Wright & Calof (2006)	Marketing International Business	Canada, p. Technology UK, p. manufacturing Europe, p. industrial chemical	Existing studies comparison	B-I—B-I	3 studies measured intelligence collection activity with different measures and different foci, different sample frames and different questions, yet they all attempted to measure the same thing. The result is a set of differences and similarities difficult to generalize.
3	Zajac & Bazerman (1991)	Management Organization Strategy	_____	Previous empirical findings	B-I—C-III	New business entry failures and acquisition premiums are often the result of biases or blind spots in BI acquisition
4	Ramakrishnan et al. (2012)	Business Information systems Management	Large firms US BI professionals	Survey	A-I—B-II A-II—B-II	Institutional pressures lead organizations to implement BI analytics for consistency. Organizational transformation requires BI analytics to adopt a comprehensive data collection strategy.
5	Singh et al. (2002)	Decision Support Information systems	North America	Questionnaires	B-III—C-I	BI fulfillment supports operational objectives and the strategy implementation phase.
6	Trim & Lee (2008)	Management Marketing	_____	literature review	B-I—C-IV C-IV—C-II	Intelligence acquisition ought to be incorporated into the strategic intelligence effort through a resilience framework.

7	Daft et al. (1988)	Management Organization Strategy	50 US Manufacturers	50 Personal interviews with executives	A-I—B-I C-I—B-I	Executives increase the frequency and scope of scanning in environment with high uncertainty. CEOs in high performing firms scan more frequently and more broadly than low performing ones.
8	Babbar & Rai (1993)	Management	_____	_____	A-I—B-I A-II—B-I B-I—B-I	New contextual approach, p. environment, p. heterogenuous/organizational, p. prospector. New scanning characteristics, p. purpose/ Intent, p. strategic/Orientation, p. Proactive.
9	Liu & Wang (2008)	Management	Commercial bank	Literature review	B-I—B-I	A mathematical model, for services business, that uses modules for forecasting performance ratios. Its accuracy depends on the quality of collected data.
10	Ghoshal & Westney (1991)	Management Strategy	3 MNC's, p. General Motors/Eastman Kodak/British Petroleum	40-70 semi structured interviews	B-I—B-I B-I—C-III	A significant gap between information needed and collected. Intelligence collection can benefit the organization in decision-making, sensitization, legitimation, and inspiration.

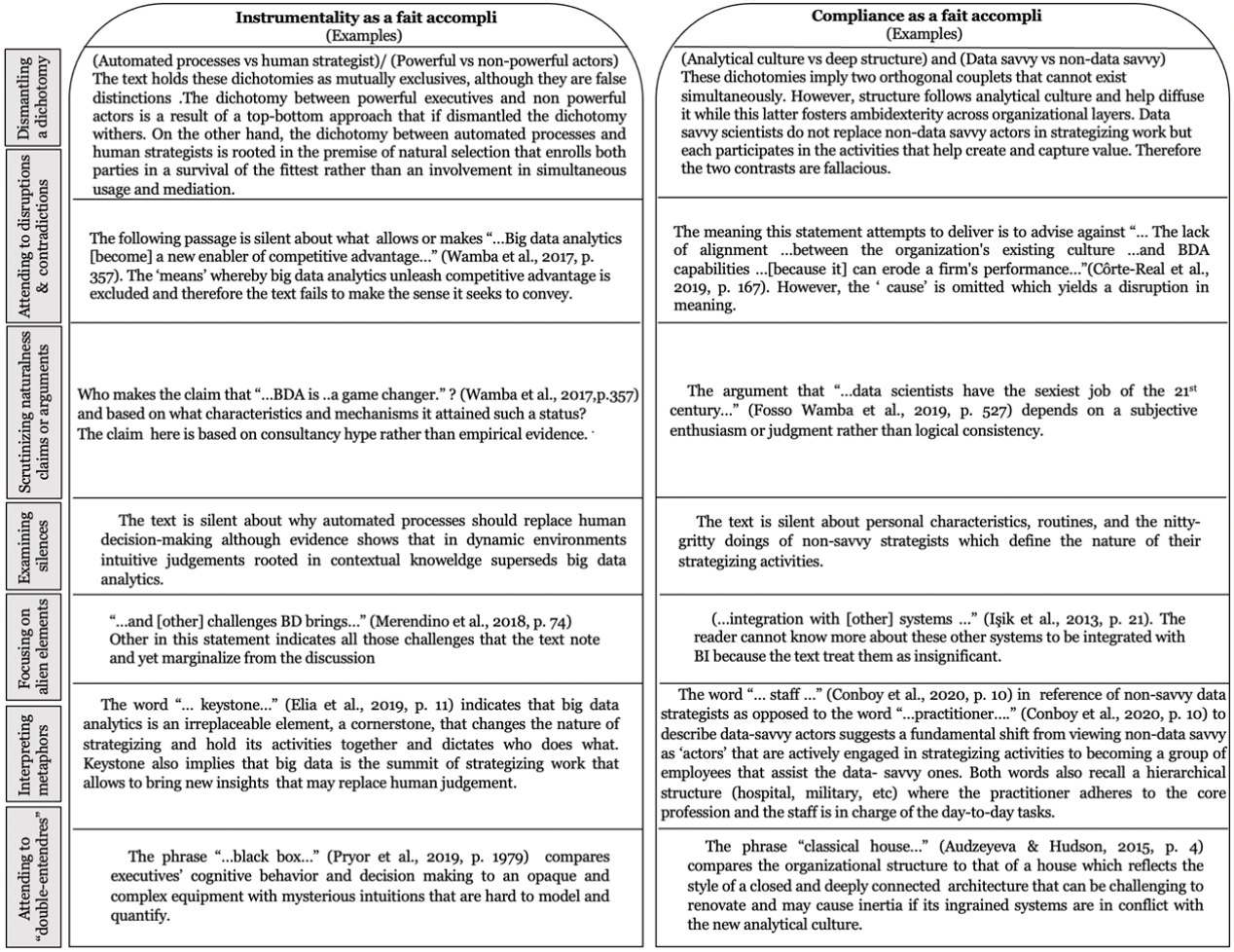

Figure 7. Exemplary illustration of how deconstruction was conducted based on Martin (1990) and Beath and Orlikowski (1994)

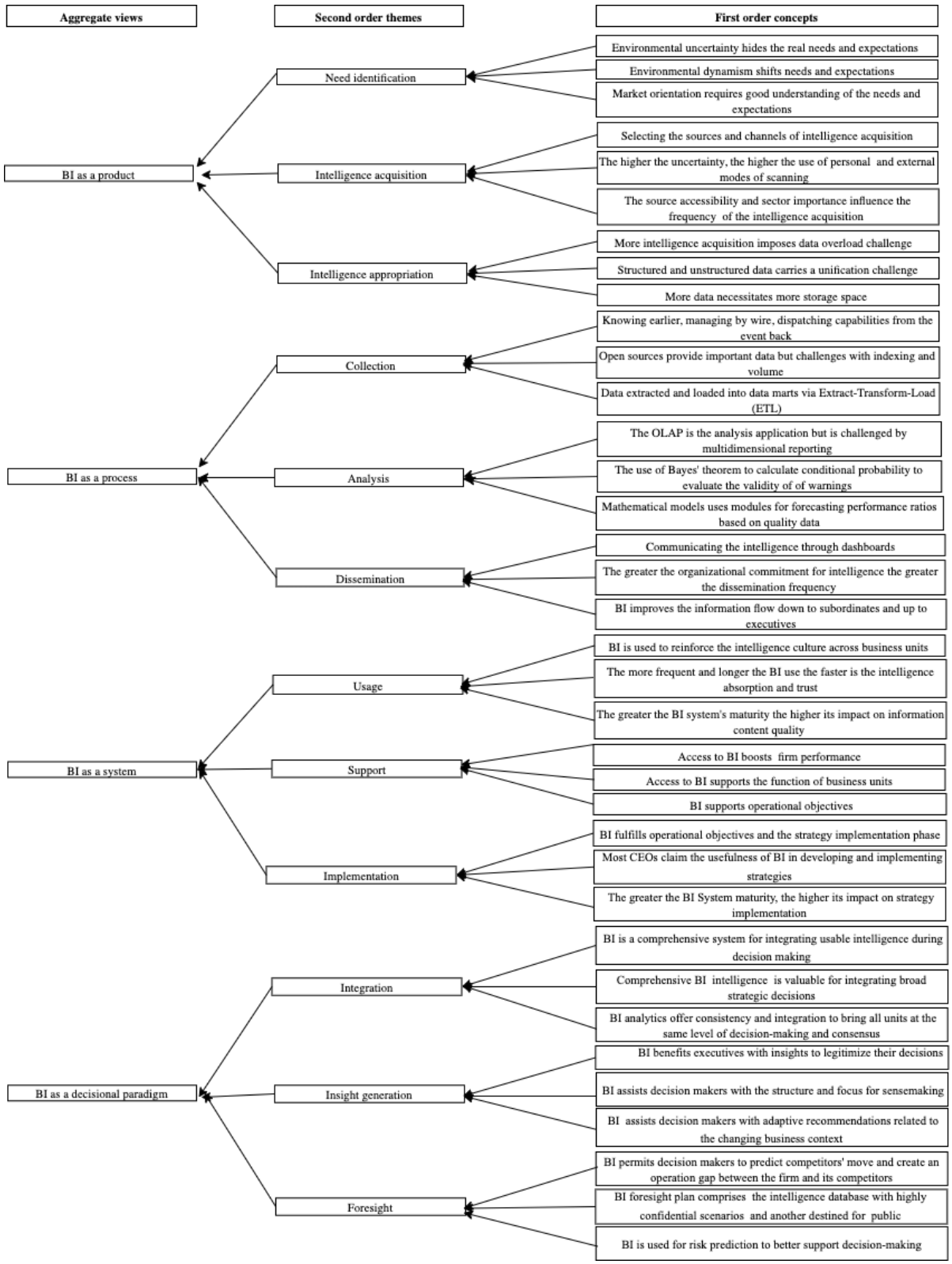

Figure 8. Exemplary illustration of how coding was conducted

The four whorls of grounded theory suggest that the end of coding—and with it sampling and collection of more data—is dictated by theoretical sampling driven by developing and purifying the categories that construct the theory (Boje, 2018; Boje & Rosile, 2020; Charmaz, 2014; Khanal, 2018). That is an iterative process where the researcher oscillates between data gathering and perusal (Creswell, 2014; Willig, 2013) until "categories are saturated [that is] when gathering fresh data no longer sparks new theoretical insights, nor reveals new properties or these core theoretical categories" (Charmaz, 2006, p. 113). Consequently, my first search round identified codes, from which categories were connected and ascribed specific features and dimensions (Khanal, 2018) that answered my hypothesis about the BI nature and definition. Concepts emerged from the categories that I scrutinized to contrast with a second search round. That scrutiny established new categories and concepts to juxtapose against the categories and concepts of the first round and then distill into a single list of categories and concepts. At this stage, some conceptual matters surfaced and two more search rounds were required to reach data saturation (Boje, 2018; Charmaz, 2014; Strauss & Corbin, 1990). At that point, I could verify the theoretical and conceptual matters directing the theoretical sampling of my research (Boje, 2018; Khanal, 2018).

3.5 Research quality

Although qualitative methods were the common denominator of what was considered "interesting research" by the board members of the Academy of Management Journal (AMJ) (Bartunek, Rynes, & Ireland, 2006), what really constitutes qualitative research still invokes confusion among academics, and particularly when the research is a product of grounded theory (Suddaby, 2006). For instance, reviewing articles for AMJ, Suddaby (2006) noticed that many authors' selection of grounded theory was not really motivated by inductive reasoning or emergent theorizing as much as it was a rhetorical sleight of hand to avoid arguing for a methodological choice. Scuddaby suggests that was mainly due to "misconceptions about grounded theory" (p. 633). Below, I list these misconceptions and explain how I sought to abide by the core tenets of grounded theory (Locke, 1996).

The first misconception is the misreading of Glaser and Strauss's stand against grand theory and is one that leads researchers to steer clear of the literature (Suddaby, 2006). In line with the four whorls of grounded theory, I have not ignored the existing body of knowledge on the topic of the study because I draw upon the distinctions between substantive theory and formal (grounded) theory, while acknowledging the necessary link between the two notions: Although formal

theory is constructed from the data, it is largely motivated by substantive theory (Glaser & Strauss, 1967; Suddaby, 2006). As a consequence, the recommendation of the researcher as a blank sheet is not to avoid contaminating researchers' minds with a priori literature but to ensure they focus on observation (Suddaby, 2006). In this regard, I have focused on research adhering to several substantive areas (as opposed to a single one) that are "frequently reflective in a given daily reality" (Suddaby, 2006, p. 635; Barley, 1986). As such, my research draws from BI, materiality, and technological sustenance that are relevant to the subject of the practice of strategy. Besides, I have also not tried to shoot for "untethered new theory" but continuously reminded myself that I am only human and my interpretations are influenced by my own perspectives. Accordingly, I have focused from the start on "the elaboration of existing theory" (Suddaby, 2006, p. 635).

The second misconception is wrongly identifying grounded theory with phenomenology which leads to research that presents raw data to maintain the authenticity of the subjective of actors" (Husserl,1969; Schutz, 1972; Suddaby, 2006, p. 635). Grounded theory closely examines how such experiences translate, at an abstract level, into theoretical accounts about the relationships between actors (Suddaby, 2006). Therefore, to avoid that misconception, I have constantly tried to "lift data to a conceptual level" (Suddaby, 2006, p. 636) to find "a slightly higher level of abstraction—higher than the data itself" (Martin & Turner, 1983, p. 147). I have thus sought the level of abstract theoretical structures reached via the constant comparison of data collection and analysis (Suddaby, 2006) to identify the most reasonable and probable statements that clarify the observed relationships (Locke, 2001). Another point worth noting is that grounded theory does not offer any easily perceived guidelines for when to stop data collection as would classic positivist research. Nor does it offer a clear separation between data collection and analysis. Instead, it encourages researchers to continue collecting data until category saturation is achieved, that is, no new evidence can be acquired from any further data gathering (Strauss & Corbin, 1998). Category saturation is a core concept of grounded theory that ensures verification and has helped me not to abandon data collection prematurely and avoid presenting raw data (Suddaby, 2006).

The third misconception is erroneously adopting interpretive methods to analyze realist assumptions (Suddaby, 2006). To avoid this scenario, the philosophical positioning of this research is twofold: in the linguistic turn as postmodernism in tandem with that of research that fits the first three whorls of grounded theory, and in the ontological turn as Peirce's realism to advance the 4th whorl of grounded theory in order to handle realist assumptions about the socio-materiality of BI, human strategists, and the social context of strategy work. Therefore, it is

important to acknowledge that the four whorls of grounded theory aim to complement each other in order to offer an account of reality and to prompt new ways of looking at social relationships and consider how those relationships produce reality (Glaser & Strauss, 1967). Accordingly, I have used the four whorls of grounded theory to verify my hypothesis 'doubt' about the BI reality and also to understand how actors interpret this kind of reality (Suddaby, 2006) and thus employ the four whorls of grounded theory to "discover theory from data" (Glaser & Strauss,1967, p. 1) to understand "an interesting phenomenon" (Suddaby, 2006, p. 636) and explain it (Boje, 2018).

The fourth misconception is mistaking grounded theory for a mechanical technique composed of a set of fixed rules that imposes a logical deductive process on a reflexive exploration (Suddaby, 2006). To avoid this error, I steered away from the positivist mode of research by considering myself an active constituent of the research process, that is, as not separate from the object of inquiry. Thus, any usage of any quantitative coding or analysis software has not, at any stage, substituted for the interpretations and the creativity of the author as applied to data categories and concepts, data collection rounds, and the meanings the elements of data evoked (Suddaby, 2006). Therefore, at all stages of this research, I have remained aware of ambiguity arising from the tension that Glaser (1978) refers to as theoretical sensitivity, which can stem from the interplay between the mechanical procedure of literature analysis software and my interpretive insights (Suddaby, 2006).

Moreover, qualitative research adheres to a code of conduct to ensure it is trustworthy; the test of which is that other researchers following the same research design should eventually reach the same results (Selltiz, Wrightsman, & Cook, 1976). This criterion is referred to as reliability and should ensure research is performed consistently well by different researchers. Another distinctive characteristic of the quality standard of qualitative studies is validity, which relates to the synergy between the results and research question and method (Hair et al., 2010). The standard seeks to verify that the researcher has found what they have set out to uncover. It is worth noting that there is no consensus over how the validity and reliability criteria should be measured. At times it seems that a one size fits all approach (Piekkari et al., 2009) has led a significant proportion of research to adopt Yin (1994)'s four tests (construct validity, internal validity, external validity, and reliability). Nevertheless, the science of criteria (criteriology) insists that ensuring research quality is still a matter of the philosophical foundations of the research (Johnson et al., 2006; Welch & Piekkari, 2017). I followed the criteriology guidelines advocating pluralism in qualitative studies and would encourage researchers to adopt quality measurements that best fit the

intricacies of their research (Guba & Lincoln, 1994; Symon & Cassell, 2012) and philosophical positioning (Johnson et al., 2006; Welch & Piekkari, 2017).

In contrast to an objectivist view of reality that assumes that truth is fixed (regardless of notions of time and space), the account within this thesis is nonetheless a reflexive one. It addresses an exploratory research question to elaborate theory (Eisenhardt, 1989; Seidl & Werle, 2018).The aim is to reflect on BI and strategizing knowledge that emanates from scientific literature whose discourses and narratives reflect the way researchers and cross-disciplinary scientific communities understand and reproduce the phenomenon (Hardy et al., 2001). The aim contrasts with one of generating generalizable findings for other researchers to replicate (Lincoln, 1998). This thesis is rooted in reflexive thinking and interested in 'truth-likeness' instead of obvious truth, which in turn makes assessing its quality a matter of how true to life its data are and how plausible its interpretations and reasoning are (Lincoln & Guba, 1985). Accordingly, disclosing how I maintained the quality of this research is not only a matter of stating the measurements adopted but a matter of divulging my biases and credos as a reflexive and subjectivist researcher (Creswell & Miller, 2000). The quality elements that closely match and represent the philosophical premise of this thesis and its author's subjectivity (Welch & Piekkari, 2017) are credibility, transferability, dependability, and confirmability (e.g., Eriksson & Kovalainen, 2008; Lincoln & Guba, 1985).

Credibility verifies whether the research findings are convincing, correspond to the data, and are rooted in sound interpretations (Lincoln & Guba, 1985). The credibility of my account was ensured by member checking (Creswell & Miller, 2000). That involved undertaking a series of validation actions checking that I had inductively derived concepts and categories from the literature in an iterative process. The collected and analyzed data were then subject to examination and critique by editors and reviewers of the journals that published the seven essays of this dissertation. Similarly, the credibility of the systematic process of data collection and analysis was also gauged against peer debriefing (Creswell & Miller, 2000), that is, the perspectives and interpretations of co-authors and other peers with expertise in BI and strategizing. The second quality element of this thesis is transferability which relates to the study being relevant and appropriate (applicability) (Lincoln & Guba, 1985). I established that the essays comprise a thorough record of the systematic search undertaken to ensure transparent reporting that other researchers could follow to reach the same sample of articles.

Furthermore, this dissertation also abides by the third quality-check component, that is, dependability. Dependability encapsulates being trustworthy, reliable, and

consistent (Lincoln & Guba, 1985). This thesis meets the dependability criterion by including an audit trail (Creswell & Miller, 2000), which required that every step of the protocol of data collection and analysis, and particularly the inclusion and exclusion criteria of articles, was delineated to the extent that I could go back at any point and rectify or recall data. This happened multiple times when reviewers questioned why some articles or some journals were or were not included, which gradually enlarged the time span (from 1985 to 2020) and the scope of the sample to encompass all articles published in more than 1500 journals on the Academic Journal Guide. Confirmability is the final aspect of quality assessment. It serves to ensure that the findings are inductively derived from the data (Lincoln, 1998). Data used in literature reviews are generally highly transparent because the data sample they report is open access, meaning other researchers can examine and challenge them. The choice of a systematic style of literature review allowed me to add a further layer of transparency vis-à-vis the databases, journals, and filtering of articles. Similarly, confirmability was also achieved by means of data triangulation, which, given the reflexive nature of this dissertation, concerns the deconstruction of all the selected articles to expose the cross-disciplinary and divergent roots of their authors, reveal internal assumptions and contradictions, and subvert its apparent significance or unity (Stake, 2000).

4 SUMMARIES OF THE ESSAYS

Seven interrelated essays serve to decompose the accepted truths and assumptions relating to BI. The essays employ reflection, endogenous reflexivity, and radical reflexivity to do so. By way of illustration, I provide a brief statement, accompanied by a visual sketch, of the main elements of each essay and the interlocking foci they carry to bring about the premise of this project. All seven essays are purposefully conceptual because this thesis seeks to unsettle the basic assumptions of research dealing with the ontological status of BI and its relationship with strategy. Kennedy (2007) and Whittemore and Knafl (2005) inform us that conceptual investigations of scientific literature can synthesize a multifaceted body of knowledge to offer a thorough apprehension of a certain subject. Such investigations can also reveal inconsistencies and dichotomies to problematize dominant narratives rather than highlight points of convergence (Boje, 1995, Buchanan, 2003, Buchanan & Dawson, 2007, Collins & Rainwater, 2005). A further benefit is the ability to unveil the episodes of social and cultural significance to the community of scholars, in this case, those producing the BI–strategy couplet literature (Ezzamel & Willmott, 2008). As such, narratives in this dissertation refer to the form of data whereby scientific articles develop the BI and strategy relationship as a body of knowledge (Knights & Morgan, 1991).

4.1 Reflection: Factual domain

The topic of BI sustenance of organization and strategy work is of paramount importance to the scholarship of strategy, management and organization theory, and science and technology studies. However, most endeavors to incorporate technology or BI into the social context of the organization, in particular that of strategizing, rely on positivist assumptions about science, use technological determinism, and thus employ "scientific reflection" (Gephart, 1996b, p. 220) to identify and introduce BI variables into scientific, prescriptive and descriptive models of strategy, management, and organization research. Below, I establish that the attempts to import BI into the strategy realm are explored reflectively, using scientific reflection on the BI treatment, to discuss the absent or misinterpreted aspects of BI, which itself is taken for granted as a "non-reflexive fact" (Gephart, 1996b, p. 220).

4.1.1 Essay 1: Conceptual constraints

From its inception in the 1970s and 1980s, BI research was rooted in determinist thinking assuming the intervention of technology in organizations was avoidable

and adopting an outside-in view of the firm, which presupposed that the external environment limits firms' actions and that competitive advantage is a result of a better positioning vis-à-vis the structure of the industry in which the focal firm operates. Therefore, the purpose of the first essay titled "Business intelligence– Capturing an elusive concept" is to discuss the conceptual constraints on BI. It provides an overview of the fragmented and disjointed treatment of BI. That treatment results from overlapping conceptualizations that converge to focus on the operational aspect of BI and the consideration of strategic thinking and the social context of strategizing as a recipient of intelligence. The essay first discusses the different definitions associated with the disparate BI-related concepts and reveals the four research clusters nurturing those different yet complementary conceptualizations.

The first conceptualization of BI views it as an interface through which a firm can sense the happenings and trends in the environment to support executives' environmental scanning (Cho, 2006; Fabbe-Costes et al., 2014; Lau et al., 2012; Wei & Lee, 2004). However, executives' bounded rationality (Simon, 1957, p. 198) coupled with a dearth of formal and comprehensive models of environmental scanning yield subjective assessments of the environment rooted in executives' gut feelings and biased cognition (Haeckel, 2004; Fabbe-Costes, 2014). Scholars focusing on executives' scanning of the environment has limited their contributions to the relationship between environmental uncertainty and executives' scanning modes and behavior, which in turn establishes BI as an activity of sensing the environment for data to input feed strategy formulation (Cho, 2006; Ebrahimi, 2000; Fabbe-Costes, 2014; Lau et al., 2012; May et al., 2000; Wei & Lee, 2004;). The interface conceptualization is hindered by data overload that results from the lack of a processual view that accompanies data from collection to dissemination, let alone the proper analytical heuristics that could slice and dice data to generate actionable intelligence (O'Reilly & Tushman 2002; Brown 2004). This processual constraint highlights another conceptualization of BI as a sequential activity channeling intelligence from the environment to the business user to reach organizational goals (Dishman & Calof, 2008; Fleisher, 2008; Liu & Wang, 2008; Slater & Narver, 2000; Wright et al., 2009; Xu et al., 2011; Zheng et al., 2012). Although this stream emphasizes the salience of analysis, it is caught in a prescriptive narrative around both the sources of intelligence (whether open or human sources) and the phases of the process of collecting unstructured and structured data and transforming those into real-time intelligence. In response, another research stream conceives of BI as a bundle of technologies and therefore concerns itself with tweaking and upgrading BI applications to improve data collection, analysis, and communication and to overcome the challenges of unstructured data and information overload (Chau et

al., 2007; Chen et al., 2002; Chen et al., 2012; Chung et al., 2005; Srivastava & Cooley, 2003). That last conceptualization yielded contributions oriented toward technical prototypes and mathematical mechanisms of BI rather than on the added value of BI in terms of matching firms' business models and meeting the intelligence needs of executives (Chau et al., 2007; Chung et al., 2005; Lin et al., 2009; Srivastava & Cooley, 2003). The last conceptualization of BI is as a support system for executives and business users to retrieve data on internal operations and industry players via an organizationally integrated input/output circuit (Leidner & Elam 1993; Volonino et al., 1995; Belcher & Watson 1993; Walters et al., 2003). This stream delineates best practices for BI adoption and implementation, which in turn takes for granted the internal environment of the firm and although retrieve internal data treats it as a follow-up setting ready to change to face the conditions and threats of the external environment. As a result, this view fails to acknowledge the role of contextual social dynamics where BI encounters human logic, inertia, and strategizing.

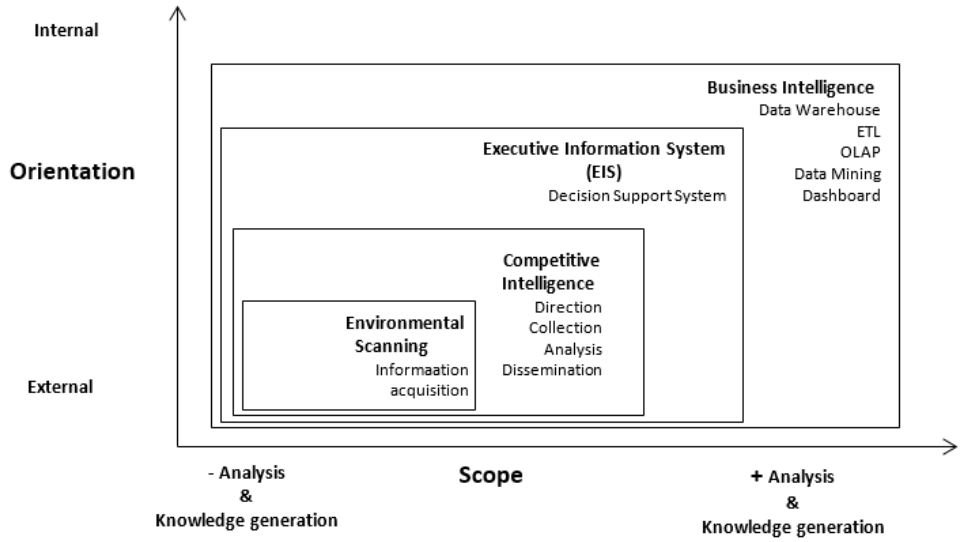

Figure 9. The BI domain (adapted from Fleisher & Bensoussan, 2003; 2007).

To conclude, the essay combines the disparate views of BI in such a way as to enhance and emphasize the qualities of each through two dimensions: environment orientation and knowledge analysis and generation, which Figure 9 illustrates in four layers. The first layer includes 'scanning' the external environment and appears within the process layer concerned with the processual sequence of collection, analyzing, and disseminating competitive intelligence. The third layer is the support system of executives that is part of the all encompassing fourth layer of BI as a sum of advances technologies and applications concerned with the funneling of data to form actionable intelligence.

4.1.2 Essay 2: Input-output boundaries

The second essay titled "35 years of research on business intelligence process, p. A synthesis of a fragmented literature" looks at the BI process and how it relates to the organizational context (Bingham & Eisenhardt, 2011; Loock & Hinnen, 2015). The essay conceives of the BI process as a comprehensive, sequential model comprising data acquisition, transformation, and exploitation (Chen et al., 2012; Davenport Thomas, Paul Barth, 2012; Trieu, 2017) that takes place in an organizational context that shapes the BI process and is shaped by it (Bingham & Eisenhardt, 2011; Loock & Hinnen, 2015). In this regard, the essay adopts a process framework (Hutzschenreuter & Kleindienst, 2006; Rajagopalan et al., 1993; Van de Ven, 1992) to discern patterns of BI process characteristics, antecedents, and consequences across the body of knowledge that make up 35 years of BI process research. Figure 10 synthesizes the interrelationships across these three dimensions. To the left of the figure are the environmental, managerial, and organizational antecedents that exert an influence on the BI process, whose phases (collection, transformation, usage) occupy the center stage of Figure 10. In its turn, the BI process influences firm performance, decision-making, organizational intelligence, as displayed on the right of Figure 10.

The synthesis revealed fragmented contributions mostly around the same prescriptive and explorative endeavors of the relationship between the BI process and the external environment and between managerial traits and the BI process. The research explored these relationships in developed and developing country settings, while at the same time neglecting to compare managerial homogeneity to heterogeneity with regard to the perception and adoption of the BI process. In addition, research has not addressed the influence of institutional pressures and cultural and social dynamics on the BI process or the causality link between this later and strategic orientation of executives and organizational members. Similarly, cognitive and emotional factors of managers and boundary spanners were absent as antecedents of the BI process despite the evidence suggesting that environmental uncertainty and BI usage depends on users' interpretations and backgrounds, which in turn affect the accumulation and transmission of tacit knowledge across the organizational structure.

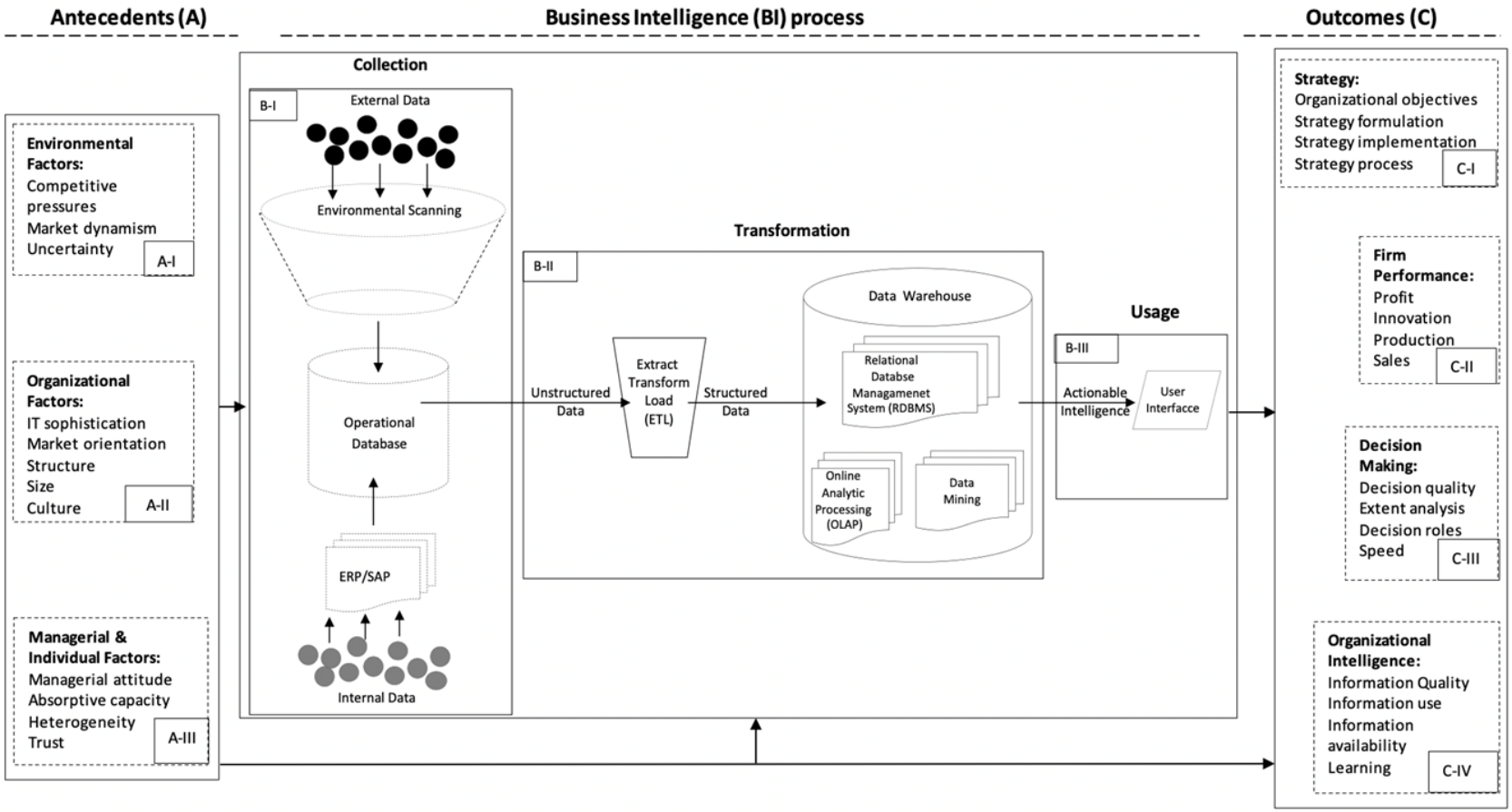

Figure 10. The BI process: An Integrative Framework

At the antecedent level, various perspectives on environmental heterogeneity and environmental uncertainty, along with partial conceptions of the BI process reducing it to the BI collection phase yielded inconclusive evidence regarding the influence of the external environment on the BI process (Boyd & Fulk, 1996; Daft et al., 1988; Ebrahimi, 2000; Elenkov, 1997; Maltz & Kohli, 1996; May, Stewart, & Sweo, 2000; Sawyerr, 1993). That said, even the BI collection phase was conceived of as ad hoc rather than as systemic activity that was part of a formal unit or structure (Bon & Merunka, 2006; Constantiou, Shollo, & Vendelø, 2019; Hughes et al., 2013; Mariados et al., 2014; Opait et al., 2016; Pryor, Holmes, Webb, & Liguori, 2019; Qiu, 2008; Robinson & Simmons, 2017). Scholarly exploration of the link between organizational elements and the BI process was also limited to the BI collection phase and its relationship with market orientation (Qiu, 2008), scarcity of resources (Christen et al., 2009), isomorphism (Ramakrishnan et al., 2012), analytical structure (Holsapple et al., 2014; Popovič et al., 2012); IT systems (Elbashir et al., 2011), and values and credos (Reinmoeller & Ansari, 2016).

The BI process, in contrast, was examined based on its three phases. The collection phase was investigated to explore its data acquisition practices and activities on scouting data sources, scouting activities, and costs. Accordingly, there is evidence of an exhaustive approach rather than a project-based one (Calof & Wright, 2008; Dishman & Calof, 2008; Michaeli & Simon, 2008; Slater & Narver, 2000; Wright et al., 2009). Likewise, the readiness of organizational capabilities to integrate formal BI collection activities (Hallin, Andersen, & Tveterås, 2017) or informal ad hoc practices (Kumar et al., 2020). In contrast, the BI transformation phase nurtured an analytical focus, due to the challenges of information overload, in terms of developing new techniques and prototypes that reduce the cycle time of data extraction and processing (Kohavi et al., 2002; Liu & Wang, 2008; Wei & Lee, 2004; Xu et al., 2011; Zheng et al., 2012). The phase also unveiled hidden themes in volumes of data (Chaudhuri et al., 2011) and combined structured and unstructured data into real-time visual displays of actionable intelligence (Chau et al., 2007; Cheng et al., 2009; Chen et al., 2012; Chung et al., 2005; Lin et al., 2009; Srivastava & Cooley, 2003; Walters et al., 2003). Finally, BI usage was addressed as an outcome in itself. It was therefore assessed based on models and feedback loops that measured the usability, accuracy, and novelty of the disseminated intelligence (Brichni, Dupuy-Chessa, Gzara, Mandran, & Jeannet, 2017) and simulated guidelines of best BI adoption practices (Vidgen, Shaw, & Grant, 2017; Wang, Cheng, & Deng, 2018) without much thought given to how to account for the alignment of the BI usage with the organizational culture and its analytical capabilities and resources (Holsapple et al., 2014; Viaene & Bunder, 2011).

With respect to the outcomes of the BI process, it seems that elements related to operational excellence such as firm performance, price competition, business value, and innovation (Abramson et al., 2005; Akter, Wamba, Gunasekaran, Dubey, & Childe, 2016; Belcher & Watson, 1993; Côrte-Real, Ruivo, & Oliveira, 2020; Ghasemaghaei & Calic, 2020; Gupta & George, 2016; Seddon, Constantinidis, Tamm, & Dod, 2016; Wang, Kung, Wang, & Cegielski, 2018;) than the one given to strategy formulation and implementation (Qiu, 2008; Vedder et al., 1999). Finally, decision-making-related variables such as the speed of decision-making and problem identification were amply explored in relation to BI support and usage (Arnott et al., 2017; Belcher & Watson, 1993; Leidner et al., 1999; Leidner & Elam, 1993; Leidner & Elam 1995).

4.1.3 Essay 3: Limits of the factual domain

The third essay titled “Seeking 'Strategy' in Business Intelligence Literature: Theorizing BI as part of strategy research” highlights how the facts of the BI literature both lack compatibility between the intelligence executives needs and the one they need and are also myopic regarding the relationship of BI and strategy. The essay inductively derives four treatments of BI as: a product (Volonino et al., 1995; Watson et al., 1991), a process (Calof & Wright, 2008; Dishman & Calof, 2008; Wright et al., 2009), a system view (Chung et al., 2005; Chaudhuri et al., 2011; Kohavi et al., 2002), and as a decisional paradigm (Cheng et al., 2009; Holsapple et al., 2014). The essay then offers a conceptual account that places BI within strategy research based on macro dimensions (strategy orientation and focus) that form the content (Porter, 1991; Rumelt et al., 1994), and the process streams (Chakravarthy & Doz, 1992; Van de Ven, 1992) of strategy research.

In Figure 11, the upper left quadrant represents an outside-in BI view focusing primarily on intelligence about the external environment (Dishman & Calof, 2008; Vedder et al., 1999; Wright et al., 2009). The view seems in tandem with the premise of the positioning school of strategy research that theorizes on value creation and capture in firms flowing from an advantageous position within the structural boundaries of their industry (Hoskinsson et al., 1999; Mintzberg et al., 1998). As such, BI feeds strategy-analytical frameworks such as the strategy map and Porter’s (1980) five forces. Intelligence is paramount for strategy formulation and assessing the differing levels of bargaining power of existing and new rivals (Rumelt et al., 1994). Such strategy tools can then become dynamic and proactive concerning changes in the industry (Kim & Mauborgne, 2004). Intelligence disseminated via BI also serves to predict trends that might jeopardize the actual

state of industry conditions (Xu et al., 2011; Zheng et al., 2012). This fact runs in tandem with research on competitive dynamics that emphasizes the short life of competitive advantage if not continuously protected and enhanced through efficient actions and reactions (Chen et al., 2012; Teece et al., 1997).

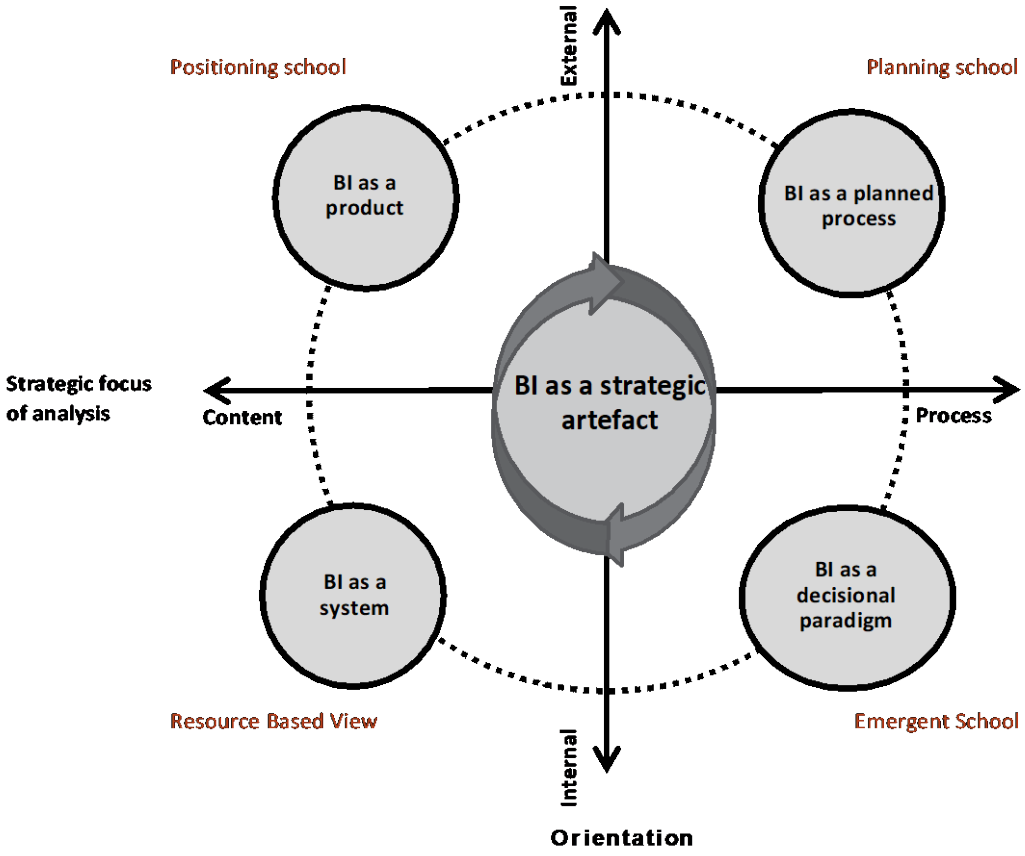

Figure 11. BI views against the outside-in and inside-out views of strategy

The upper right quadrant illustrates the BI process of turning unstructured data into intelligence that limits executives' bias and gut feeling and instills rational thinking (Dishman & Calof, 2008; Fleisher, 2008; Wright & Calof, 2006). The linear and sequential nature of this process is reminiscent of Ansoff's (1965) planning school of strategy that prescribes a formal, sequential, and rational model of phases to resolving the wicked problems of strategy formulation (Huff & Reger, 1987; Mason & Mitroff, 1981;). As such, both the BI process and the planning school of strategy follow a rational and systematic model of industry analysis prior to formulating strategies and making decisions (Fredrickson & Mitchell, 1984). The lower-left quadrant highlights the inside-out view of BI technologies—data warehousing, online analytical processing (OLAP), data mining, extract-transform-load (ETL), and the user interface—as internal resources and

capabilities that determine a firm's strategy and competitive advantage (Hoskinsson et al., 1999). As such, when a company develops and acquires advanced and valuable BI technologies, it increases its potential to capture higher value (Barney, 1991; Newbert, 2007; Peteraf, 1993). That is because it leverages and exploits BI technologies to improve firm performance and establish operational excellence (Mahoney & Pandian, 1992). Although BI technologies are necessary for superior returns, they are not sufficient to secure the sustainability of a firm's competitive advantage because that hinges upon the particular routines BI technologies infuse into the organizational processes. Therefore it is the ability of firms to replicate these routines and practices that can sustain greater value capture (Barreto, 2010; Collis, 1994; Eisenhardt & Martin, 2000). The remaining lower-left quadrant illustrates BI integration and alignment with organizational culture and business units (Holsapple et al., 2014) through processes of knowledge management (Cheng et al., 2009). That alignment places BI within the processual school of strategy (Whittington & Cailluet, 2008). This inside-out view of BI is nonetheless not adequate unless it accounts for emergent and unintended outcomes of the strategy process in light of unpredictable interactions with the business environment (Balogun & Gleadle, 2005; Cyert & March, 1963; Mintzberg & Waters, 1985; Mintzberg et al., 1998). Such outcomes can be accounted for through astute and resilient BI that considers trial and error, learning and unlearning, and adheres to a two-way flow of information between top management and business units that puts forth retrospection and recognition of the impact of context on strategic thinking (Ezzamel & Willmott, 2004; Mintzberg, 1987; Quinn, 1980).

The essay concludes with a juxtaposition of the four BI views against the strategy-as-practice realms (institutional, organizational, and episodic) as Figure 12 indicates (Johnson et al., 2003; Whittington, 2007). Accordingly, the episodic realm of strategizing hosts sophisticated BI technologies such as the extract-transform-load (ETL) whose role is to reduce heterogeneity in copious amounts of internal and external data by converting it to homogeneous data tidbits and loading into the data warehouse. The organizational realm, in contrast, benefits from the data warehouse relational database management system (RDBMS) that allows all organizational members to run queries across volumes of data stored in the data warehouse. Similarly, the online analytic processing (OLAP) server contributes further to the organizational realm by uncovering themes and patterns in the data and offering all business users capabilities like data slicing and dicing and also data drilling. Organizational members necessarily benefit from the visual and user friendly data display of the BI dashboard, spreadsheets, and the user interface. Finally, the institutional realm profits from the ability of data mining

engines to run predictive scenarios to make sense of the focal firm's industry (Chaudhuri et al., 2011; March & Hevner, 2007).

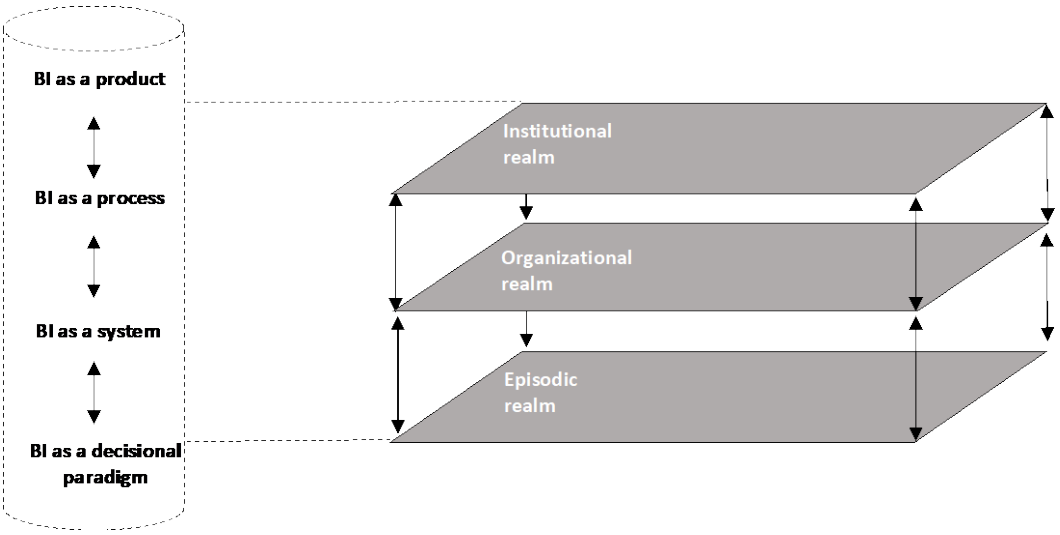

Figure 12. BI views against the three realms of strategy-as-practice

4.2 Endogenous reflexivity: Beyond the factual domain

Although reflection reveals "the lacunae within generally accepted frameworks and the points at which they require elaboration," it does not help scholars trying to conceive of or examine BI in a way that transcends existing concepts and empirical findings, that is, the factual domain. Such transcendence calls for endogenous reflexivity, which starts with the "limits of reflection and focuses on the social construction of scientific facts" (Gephart, 1996b, p. 220; Knorr-Cetina, 1981). As such, it de-reifies BI, that is, it ceases to treat it as a recognizable, single, and coherent entity and offers an alternative understanding of BI and how different actors approach its features to make up their social world (Gephart, 1996b; Knorr-Cetina, 1981). Below, I outline how endogenous reflexivity reveals "differential constructions" and the way the "situational production of knowledge" on BI in turn constructs BI as an attribute of "social settings" (Gephart, 1996b, p. 220).

4.2.1 Essay 4: Exposing the scientific community

The first step in offering a different understanding of BI is to break down the body of knowledge on it into its constituents. In this regard, the fourth essay titled "Of BI research: A tale of two communities" seeks to record in detail the BI literary landscape and expose the scientific communities that make up the BI body of

knowledge. For this, the essay uses co-citation analysis to conduct a bibliometric investigation of the BI literature to map its scientific landscape (see, Figure 13).

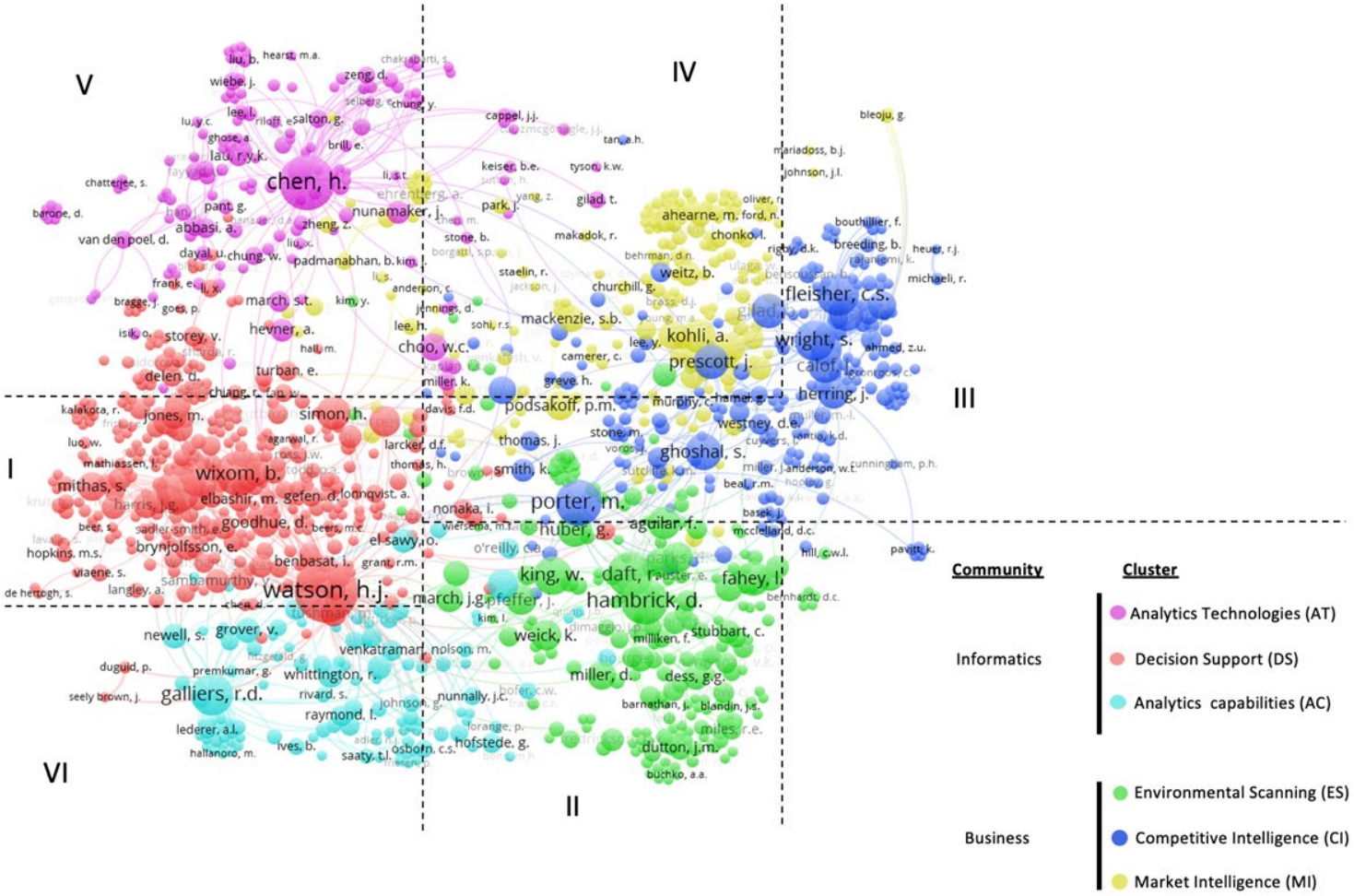

Figure 13. Quantitative identification of the BI research clusters

The essay identifies two scientific communities (informatics and business), which bifurcate into six research clusters that underpin the BI scientific knowledge. They also rely on disparate theoretical grounds. The essay also reveals the lack of ontological and epistemological compatibility between the two communities, which foments a business-informatics dichotomy that impedes joint theoretical progress based on identifying cross-disciplinary research gaps.

The first cluster (environmental scanning) finds scaffolding in industrial economics that conceptualizes the actions of organizations as resulting from their environment structure. It is that structure that constrains the maneuvers of organizations and thus impacts their performance (Brownlie, 1994; Peyrot et al., 1996). Consequently, organizations need to proactively engage in environmental scanning as part of the strategy process to detect strategic opportunities (Cho, 2006; Fabbe-Costes, Christine, Margaret, & Taylor, 2014; Lau, Liao, Wong, & Chiu, 2012; Robinson & Simmons, 2017; Reinmoeller & Ansari, 2016).

The second cluster (competitive intelligence) is rooted in marketing research (Dishman & Calof, 2008; Schollhammer, 1994) and in the structure-conduct-performance-(S-C-P) paradigm (Bain, 1956, 1968; Mason, 1939) and its Porterian (1980) models of industry analysis (Dishman & Calof, 2008; Ghoshal & Westney, 1991).

The third cluster, market intelligence, is grounded in social exchange theory (Homans, 1961), the cognitive selling paradigm (e.g., Fleisher et al., 2008; Kahaner, 1997; Mariadoss, Milewicz, Lee, & Sahaym, 2014; Rapp, Agnihotri, & Baker, 2011; Rothberg & Erickson, 2005), expectancy theory (e.g., Le Bon & Merunka, 2006; Tyagi, 1985; Sujan, 1986;), Nielsen's market measures, and the Dirichlet research on market measures, such as market share and penetration, used to gauge an organization's operational excellence (Farris, Bendle, Pfeifer, & Reibstein, 2006; Zheng et al., 2012).

The fourth cluster, decision support, draws on contingency theory (Burns & Stalker, 1961; Lawrence & Lorsch, 1967) and systems theory (Miller, 1972; Boulding, 1981), the Gorry and Morton framework (1989), and Simon's model of decision-making (1947) for its organizational survival argument that views competitive advantage as a result of aligning both structure and technology with environmental requirements (Huber, 1984). A further influence on this cluster emanates from organizational ecology (Carroll, 1990; Hannan & Freeman, 1977) and transaction cost economics (Williamson, 1983) to support its second premise of transferability and controlling technology (Gherardi, 2000; Petrini & Pozzebon, 2009).

The fifth cluster, analytics technologies, reflects a continuously changing stream following ad hoc rationale and based on functional linguistic theory or sentiment analysis (Abbasi & Chen, 2008; Lau et al., 2012). The cluster is concerned with the needs of firms in terms of intelligence infrastructure, algorithms, and technologies (Lin et al., 2009). It provides indicators to assess firms' analytical and predictive capabilities (Brichni et al., 2017; Gupta & George, 2016; Hallin, Andersen, & Tveterås, 2017; Rouhani, Ghazanfari, & Jafari, 2012).

The final cluster, analytics capabilities, offers a knowledge-based view (Grant, 1996), dynamic capabilities (Teece, 2007), and organizational learning ambidexterity (Jansen, Tempelaar, van den Bosch, & Volberda, 2009) to extend the scope of BI influence to deliver business value (Akter et al., 2016; Bordeleau, Mosconi, & de Santa-Eulalia, 2020; Shollo & Galliers, 2015). Nevertheless, it also adopts a sociological lens based on practice theory to embrace a conceptualization of BI as an enabler of organizational knowing (Choo, 2002; Kolb & Kolb, 2005; Peppard, Galliers, & Thorogood, 2014; Shollo & Galliers, 2015).

Finally, the essay theorizes the evolution of BI research in light of two pendulum swings: from an outside-in collection focus to an emphasis on inside-out analysis to a nascent shift toward micro-level practices. Notwithstanding these swings, the BI research is dominated by contributions from the informatics community as opposed to plummeting interest from the business community due to the challenging conceptualization of BI as part of organizing and strategizing practices.

4.2.2 Essay 5: Deconstructing the established assumptions

Despite the growing importance of technology sustenance in strategy research (Dameron et al., 2015; Lê & Spee, 2015) and in STS (Orlikowski & Scott, 2008; Zammuto et al., 2007), it seems the nature of these material technologies is often treated peripherally. In response, the fifth essay titled "A deconstructive re-reading of the "big data analytics/strategizing" relationship" embarks on an ontological project to re-examine the status of big data analytics in the practice of strategy (Orlikowski & Scott, 2008; Zammuto et al., 2007). Consequently, it presents ways to rethink the material–social distinction (Bailey, Faraj, Hinds, Krogh, & Leonardi, 2019), which bolsters the relationship between big data analytics and strategizing (Arnold, 2003; Barley, 1998; Leonardi & Barley, 2008).

In this context, the essay adopts an endogenous reflexivity view to transcend the taken-for-granted assumptions about BI and question BI's ontological status and how it relates to the social milieu of strategizing as a 'genre' that influences strategy

practitioners (Levina & Orlikowski, 2009; Orlikowski & Yates, 1994; Seidl & Whittington, 2014). The essay uses the lenses of strategizing and big data analytics to highlight the tension between agency and technology. To do so, it presents a deconstructive analysis of the literature published over the last 40 years on the notion of big data analytics—an umbrella including BI—and its relationship with strategizing. The findings show that the significant focus on the mediative role of big data analytics has produced academic discourses that do not deal seriously with the notion of big data analytics and its relationship with strategizing. Specifically, the essay draws on Latent Dirichlet Allocation to reveal that this relationship is subject to two faits accomplis: instrumentality and compliance (see, Table 4). The essay then adopts Derrida's deconstruction to problematize the underlying assumptions, conflicts, tensions, and contradictions of the two faits accomplis.

First, the instrumentality of big data analytics in the social milieu of strategizing is conceived of as a certainty that alters organizational structures and strategizing practices prior to and despite the actions of strategy practitioners who can only integrate it into their daily activities as 'a fait accompli' (Constantiou & Kallinikos, 2014; Davenport, 2014; Zaki, 2019). The text continuously alludes to the causality of big data analytics, its interventions in strategic planning processes, and in strategy workshops (Audzeyeva & Hudson, 2015; Elia, Polimeno, Solazzo, & Passiante, 2019; Wamba et al., 2017; Woerner & Wixom, 2015). There is also mention of its unavoidable intrusion into strategizing practices and altering the way they are conducted (Côrte-Real et al., 2017; Elia et al., 2019; Peters, Wieder, & Sutton, 2018;). This narrative is grounded in a top-down conceptualization of the firm that reduces the social to a silent milieu that attends to the needs of top management and the requirements of big data analytics (Pryor et al., 2019).

In the meantime, the text roots the influence of top management in their powerful position, rather than being a product of complex psychological factors and decision-making processes. The approach legitimizes its support of executives and leaves the black box of the relationship of executives and business users unaddressed (Constantiou et al., 2019; Elia et al., 2019; Kunc & O'Brien, 2019; Lin & Kunnathur, 2019; Merendino et al., 2018; Pryor et al., 2019). Despite its deterministic treatment of the big data analytics–strategizing couplet owing to big data analytics' input into executive decision-making, the text contradicts its claim by hinting at the power of the intuitive judgment of executives, which is difficult to model and can resist the intrusion of big data analytics into executive decisions (Bhimani, 2015; Constantiou et al., 2019).

Table 4. Top Words for the topics selected

Instrumentality as a fait accompli				Compliance as a fait accompli			
Uncertainty	**Simulation**	**Scenario**	**Foresight**	**Value**	**Integration**	**Capability**	**Project**
uncertainty	predictor	scenario	foresight	value	integration	big	project
scanning	dynamic	query	knowledge	capability	intelligence	analytic	competency
environment	simulation	tool	industry	performance	group	data	executive
environmental	scenario	strategy	scenario	organizational	organization	capability	director
perceive	map	approach	planning	resource	competitive	practice	team
manager	analytic	method	market	organization	planning	value	environment
executive	development	user	competitor	technology	structure	company	operational
strategy	innovation	group	customer	knowledge	capability	organization	corporate
organization	knowledge	expert	organization	dynamic	enterprise	analytical	analytical
activity	computer	agent	activity	bda	technology	framework	plan
organizational	framework	application	strategy	bi	competitor	real-time	bd
firm	performance	evaluation	organizational	datum	task	technology	datum
performance	industry	framework	network	strategy	tool	application	mining
industry	network	future	company	manager	problem	resource	intuition
market	customer	technique	product	competitive advantage	technique	tool	senior
source	market	problem	development	market	practice	skill	vision
sector	value	design	future	implementation	strategy	warehouse	problem
level	strategy	level	technology	firm	plan	user	resource
company	firm	case	approach	operational	manager	transformation	informant

Instrumentality as a fait accompli			
Uncertainty	**Simulation**	**Scenario**	**Foresight**
study	operation	alternative	competition
external	outcome	set	production
high	increase	different	innovation
scan	product	action	material
factor	estimate	number	external
sample	year	propose	different
relationship	propose	weak signal	new
great	indicator	apply	case
frequency	entrepreneurial	term	unit
low	company	goal	focus
top	could	concept	see
internal	service	step	role
measure	improve	example	view
economic	app	report	service
variable	conduct	consider	way
task	identify	value	cost
respondent	design	show	firm
table	sector	represent	lead
find	impact	help	know
difference	chain	identify	would
test	drive	criterion	example
indicate	capture	target	increase

Compliance as a fait accompli			
Value	**Integration**	**Capability**	**Project**
construct	company	customer	client
measure	meeting	datum	would
factor	organizational	service	bank
level	application	new	could
table	activity	create	credit
quality	communication	insight	relationship
item	study	case	say
relationship	participant	enable	view
test	marketing	benefit	many
high	member	source	see
impact	respondent	improve	new
literature	list	build	effort
effect	identify	drive	success
show	electronic	manage	likely
measurement	large	example	even
dimension	find	study	service
order	facilitator	generate	much
survey	type	innovation	failure
customer	improve	help	board
success	level	enterprise	manage
enable	idea	challenge	level
data	success	healthcare	term

Instrumentality as a fait accompli			
Uncertainty	**Simulation**	**Scenario**	**Foresight**
condition	lead	factor	possible
country	stage	evaluate	well
increase	industrial	individual	take
maker	cluster	weight	value
size	table	present	internal
response	critical	paper	exist
hypothesis	number	search	potential
show	focus	signal	analyse
scale	pc	describe	become

Compliance as a fait accompli			
Value	**Integration**	**Capability**	**Project**
suggest	market	understand	compliance
role	high	well	shift
share	report	way	objective
understand	leader	people	impact
study	key	report	seem
view	department	capture	view
assess	would	product	asset
improve	first	potential	thing
response	computer	many	account

The text also contradicts its premise that big data analytics can alter the doings of strategizing when it acknowledges that the affordances of big data analytics are enacted out of these doings, which in turn calls for further alignment between the social context and big data analytics that depends on time and context to reach maturity (Conboy et al., 2020; Côrte-Real, Ruivo, Oliveira, & Popovič, 2019; Dokhanchi & Nazemi, 2015; Elia et al., 2019). Therefore, to unleash its full gamut of applications and reach its full agency, big data analytics needs to become an organizational capability rather than an executives' resource (Côrte-Real et al., 2019; Lin & Kunnathur, 2019; Mikalef, Boura, Lekakos, & Krogstie, 2019). However, the text returns to its inherent determinist tone when it devises guidelines to ensure such alignment, which it entrusts to executive leadership (Côrte-Real et al., 2019, p. 167). In so doing, it reduces the social context to a passive role in relation to executives' actions and big data analytics' instrumentality (Mikalef et al., 2019). Finally, the text also assigns the responsibility for alignment to the powerful data-savvy and automated processes who must replace the non-data-savvy practitioners to lift organizational barriers and ensure a better way of engaging with big data analytics in the doings of strategizing (Bhimani, 2015; Grover, Chiang, Liang, & Zhang, 2018; Mikalef et al., 2019).

Second, given that the occurrence of big data analytics in the social context of strategizing is unavoidable, the social can only be ready to accept big data analytics' intervention without protest, and therefore, its compliance is inevitable. Compliance is reflected in the text's treatment of the big data analytics–strategizing relationship as a binary system with two opposite poles: data scientists and new data culture and automated systems on the big data analytics side, and the non-data-savvy strategists and deep structure on the social side. The text clearly favors the first side (data-savvy scientists) of the material–social separation, and oppresses the other side (non-data-savvy strategists) who need to upgrade their skills and routines to accommodate big data analytics and who do not seem to be affected by the new affordances that strategists enact when using it in situ (Audzeyeva & Hudson, 2015; Kunc & O'Brien, 2019). Currently, the text alleges that the lack of awareness and understanding of analytics on the part of non-data- savvy staff leads to a failure to generate the full benefits of big data analytics (Conboy et al., 2020; Wamba, Akter, & de Bourmont, 2019). In contrast, data-savvy practitioners actively exploit the full benefits of big data analytics (Fink, Yogev, & Even, 2016; Gupta, Sarkar, & Singla, 2014) thanks to their analytical expertise that gives them the right to lead strategizing activities and integrate big data analytics in the organizational structure and culture (Wamba et al., 2019; Conboy et al., 2020). Moreover, this new responsibility grants them authority over

auditing and deploying the best talent to deliver the best fit between strategizing activities and the new analytical culture that big data analytics imposes (Audzeyeva & Hudson, 2015; Pappas, Mikalef, Giannakos, Krogstie, & Lekakos, 2018). Eventually, the text contradicts itself in stressing the importance of interactions and feedback loops between data-savvy and non-data-savvy organizational members (Urbinati, Bogers, Chiesa, & Frattini, 2019). These are presented as a type of Plan B to alleviate inertial status quo and curb the imprinting of the deep structure on the practice of strategy that can produce silos and inhibit the maturity process of big data analytics (Audzeyeva & Hudson, 2015; Fink et al., 2016; Mikalef et al., 2019).

4.3 Radical reflexivity

Radical reflexivity addresses "the very limits of human knowledge" (Gephart, 1996b, p. 220). It thus transcends the ceiling beyond which reflection and endogenous reflexivity cannot extend or pass. Put differently, if endogenous reflexivity seeks to reveal the prospects of an alternative conception of BI, radical reflexivity addresses "the limits to conceiving of a world" made up with BI, that is, available as an alternative to BI (Gephart, 1996b, p. 220). Radical reflexivity problematizes the underlying assumptions of the scientific and literary views of BI, and even the likelihood and consequences of using science and literature as ways of conceiving of worlds (Gephart, 1996b, p. 221). In the last two essays, I discuss how the notions and simulation and simulacra are used to re-conceive BI in "radically reflexive terms as a basis for a truly postmodern" perspective on technology and strategizing. Based on this view, BI is "radically re-reified then re-conceived as images or copies" of technology that supplants technology itself because "behind the simulacrum, nothing remains" (Gephart, 1996b, p. 221).

4.3.1 Essay 6: A sociomaterial framework

The preceding three essays applied endogenous reflexivity to lay the foundation of an alternative conception of BI, one viewing BI as a constituent of social construction. The sixth essay titled "BI-in-practice: A look at how BI enacts framing contests and affects the service transition path" adopts a radical reflexive perspective on BI that transcends the limits of endogenous reflexivity to demarcate the frontiers of scientific knowledge on the sociomaterial view of BI, which has been touted as a remedy to the technological determinism myopia over the social condition. The essay seeks to challenge the premise of sociomateriality by demonstrating that the entanglement of the human- and technology-grounded enable social interactions among divergent worldviews of reality (Orlikowski,

2000). Those interactions in turn produce meaning contestations rather than alignments (Orlikowski & Gash, 1992). For the purposes of illustration, the essay presents a transformational process of a business model conducive to an organizational change from product-based to a service-dominant logic (Benedettini, Neely, & Swink, 2015; Kowalkowski, Brehmer, & Kindström, 2009). That is a process of change subjected to an interpretative process (Davidson, 2006; Barr, 1998) wherein two cultures (manufacturing vs. services) draw upon their interpretations schemata to understand BI as they socially construct (Berger & Luckmann, 1967) the transition from a product to a services logic. For such a transition to happen, multiple technologies must be employed, among which BI comes at the top of investment budgets (Gephart, 2004; Gartner Press, 2014). However, BI is a bundle of technologies with various distinctive attributes that are viewed and exploited according to the different needs and choices each of the two cultures will select (Leonardi, 2013; Markus & Silver, 2008). Those needs and choices can have different implications (Burton-Jones & Straub, 2006; Leonardi, 2013). In other words, when BI is adopted, it is caught in between two logics—an existing culture of manufacturing and an emergent counter-view of services—that now have to make sense of BI following their disparate worldviews. That process leads the meaning of BI to be contested owing to what Gebauer, Fleisch, and Friedli (2005) call the clash of the manufacturing and services cultures.

Each of the two cultures represents a reality that was socially constructed by its adherents following their frames of reference to explain and experience action (Orlikowski & Gash, 1994; Brummans et al., 2008). Therefore, the essay examines the frames of reference of manufacturing and services cultures to unveil how the meaning of BI emerges as both cultures apply their technological frames of reference (TFR) (the portion of interpretative schemata that relate to the assumptions actors rely upon to understand technology) to interpret what BI denotes (Orlikowski & Gash, 1994). The essay employs Galbraith's (2002) portrayal of the characteristics constituting manufacturing and services cultures to present the TFRs that both cultures draw upon to make sense of and use BI (Orlikowski & Gash, 1994). The TFRs can also be applied to address the discrepancies in expectations and utility of BI as both cultures make sense of it. Figure 14 synthesizes the manufacturing and services TFRs around three areas: the nature of BI, that is, *the way users think of BI and its features*; strategy, that is, *what users believe was the purpose of adopting BI*; and use, that is, *how users see the utility and output of BI* (Orlikowski & Gash, 1994).

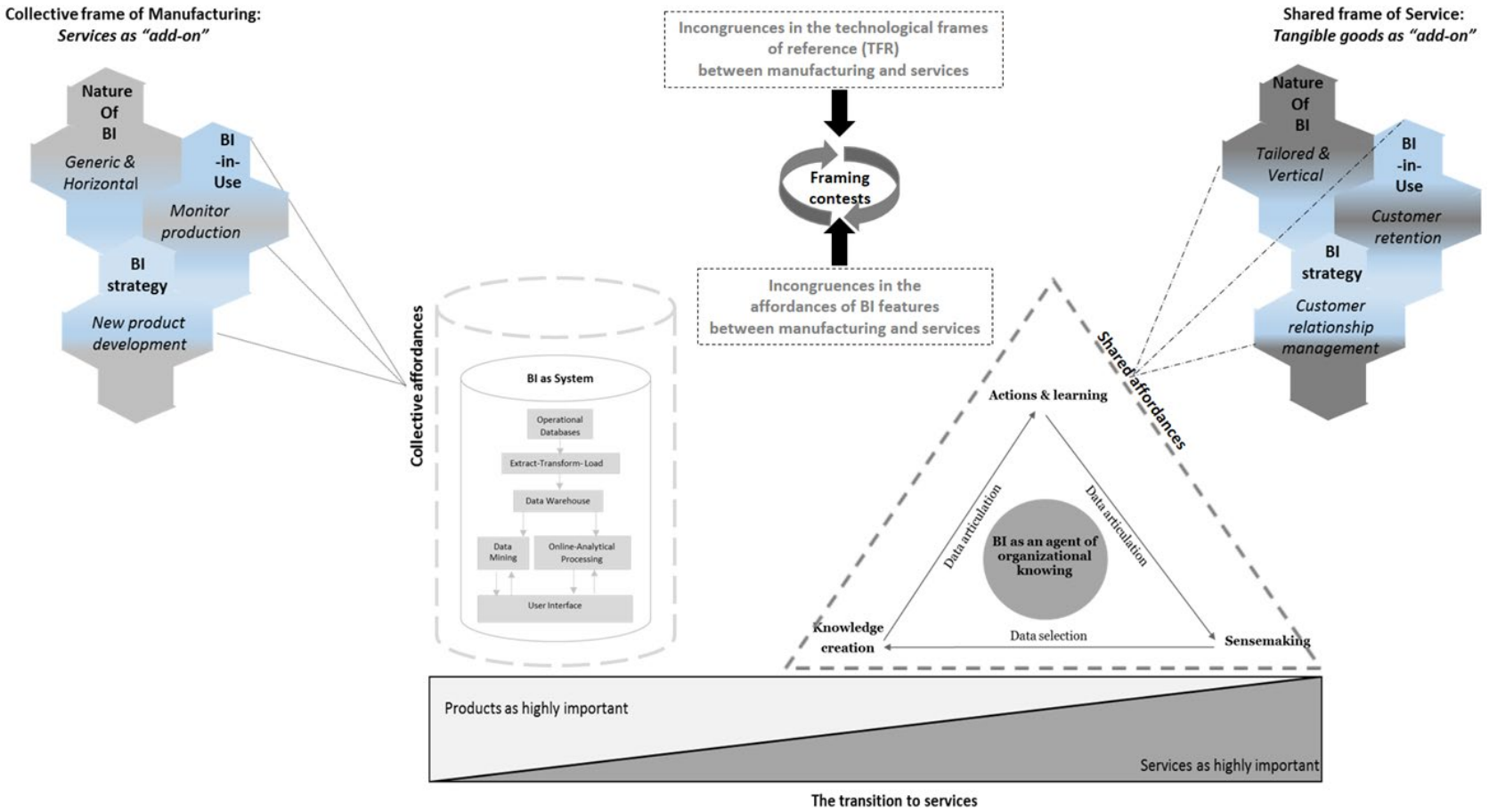

Figure 14. The incongruences causing framing contests as manufacturing and service units shape and are shaped by BI during servitization (based on Davidson (2002); Leonardi (2013); Orlikowski & Gash (1994))

In light of the aforementioned domains, the essay categorizes contests over BI meaning into 1) interpretive and interactive incongruences (Pinch & Bijker, 1987) between the manufacturing and service cultures, and 2) incongruences over the affordances the BI features enact. Collective affordances enacted by a manufacturing culture where interdependence is low and tasks are executed at the individual level, assembled at the team level to produce results (Leonardi, 2013; Thompson, 1967). In contrast, shared affordances enacted by a service-dominant logic that requires a high degree of interdependence, interaction, and coordination across heterogenous groups to initiate, plan, execute, monitor, and deliver projects (Leonardi, 2013; Guzzo & Shea, 1992).

4.3.2 Essay 7: A semiotic framework

While the sixth essay problematized the sociomateriality view of BI, the seventh essay titled "A theory of practice beyond the human: From doings with things to doings as a tendency of things" uses Perice's semiotics as a basis of radical reflexivity to contest the factual accounts on the sociomateriality view of BI and discuss the emergence of third-order BI simulacra. The essay begins by reviewing the theoretical approaches that motivate the treatment of material things in the practice of strategy via a sociomaterial lens. This focus is motivated by the turn to the "thingness of things" in the strategy-as-practice scholarship to extend linguistic representation and attend to the ways matter intrudes into our representational and discursive frameworks (Dameron, Lê, & LeBaron, 2015; Lê & Spee, 2015). The essay deconstructs the premises of this sociomaterial treatment to show such an exploration makes any investigation of the interrelationships of the material and the human in producing social order and reality, without rejecting representation or material agency, impossible. In response, the essay grounds the doings of strategy and representation in the logics of semiotics to rehabilitate the status of material technologies in general, and of BI in particular, and acknowledge form patterns and emergence as mediators of the relationality of BI and the human in the practice of strategy.

The sociomaterial treatment of material technologies draws on the works of the new materialists (e.g., Austin, 1962; Barad, 2003, 2007; Bennet, 2010; Butler, 1989; Haraway, 1991; Pickering, 1995; Rouse, 1996). Those works relied on contesting the power of language to represent and determine the nature of material technologies. The work cited ousts linguistic representation—a heritage from atomism and Cartesian demarcation of a representing knower and entities to be represented—from the way we think about the material as passive and rigid or

malleable within the context of linguistic representation that conditions its status (Lemke, 2015; Barad, 2003, 2007).

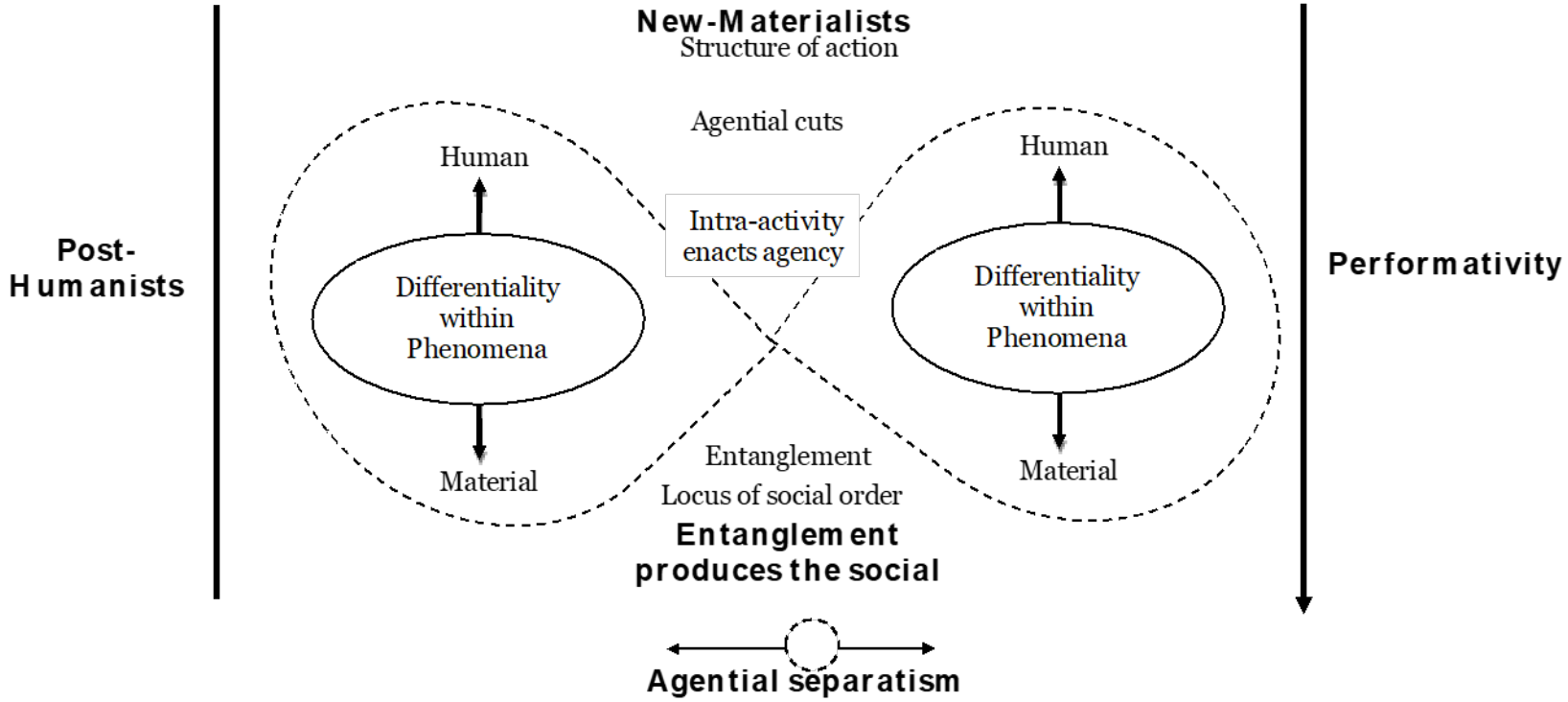

Figure 15. The status of the material following agential realism

Sociomateriality rejects the Cartesian ontological separation between representing subjects and things to represent. It offers a performative understanding of the material that shifts attention from linguistic representation to the nature of practices (Barad, 2003; 2007). Sociomaterialiy traces representation to Democritus' atomism, denounces its worth, then substitutes it with performativity. Here, performativity is relational par excellence, and causality is a matter of intra-action between practices 'embodied in all configurations that produce the material', and phenomena 'the relations of the material produced' (Barad, 2003; 2007). Contrary to representationalism, phenomena here mark the entanglement, rather than the separability, of the subject and object (Barad, 2003; 2007) (see, Figure 15). Besides, phenomena do not emanate from *relata* as in atomism, but it is the intra-actions that bring *relata* to life within phenomena relations (Barad, 2003; 2007). Intra-action denotes a shift from interaction that implies an ontological separation between pre-existing entities and relata (Barad, 2003; 2007). Both causality and agency are handed to intra-actions that determine the boundaries and meaning of the parts of the phenomena (Barad, 2003; 2007).

In contrast to the epistemic or Cartesian cut that presupposes an inherent separation between known and knower, intra-actions separate the subject from the object because of what Barad terms 'agential cut' to emphasize the enacting of relata within phenomena; that is, intra-actions are the agent enacting relata and hence the separation between the subject and object (Barad, 2003; 2007). So, the agential realism of sociomateriality does not reject separatism; it only rehabilitates its status post intra-actions, hence agential (Barad, 2003; 2007). It follows that there are only phenomena in the world that come to light through intra-actions. There are no things or concepts (Barad, 2003; 2007). Nothing is ideational, but everything is actual material-discursive configuration 'practice' including talk and discourse (Barad, 2003; 2007). However, agential separatism brushes over the possibilities (causes and effects) of agential cuts, which leaves agency floating in the realm of intra-activity (Rosiek & Snyder, 2018). As a result, except for ousting the human and enthroning the material as agent, sociomateriality's agential realism re-instigates the human–material dualism it sets out to dissolve, because it assumes an opposition between semiotics and the material in so far as any exploration of the material should push semiotics aside to understand it, which in turn disposes of questions of representation to comprehend the material (Crossland & Bauer, 2017; Kohn, 2013; Rosiek, 2018).

This rebuttal is not of semiotics per se as much as it is of Saussurean semiotics that give primacy to representation and symbolism, which attracted criticism from none other than the two acclaimed semioticians Derrida and Peirce, who refused

to limit semiotics to language or exclude this latter from the former (see, Jackbson, 1977; Crossland & Bauer, 2017). Poststructuralism's thesis of a meaning that is never fulfilled but constantly in play between a linguistic signifier and transcendental signified that evades all representation (Derrida, 1993; Derrida, 1998; Rosiek, 2018). The theory sets out the ground for sociomaterialists to question the representational power of semiotic signs (Rosiek, 2018) and resurrect materiality as a mediator of encounters with reality—differing from poststructuralism that restricts agency to the human domain (Rosiek, 2018; Rosiek & Snyder, 2018)—and theorize on agency in the material or in the process of intra-actions (see, Barad, 2003; 2007) to curb the restriction of human agency.

In response, the essay shows that Peircean semiotics has never been about representation and has been applied across various disciplines for its nonrepresentational construction of life (see, Croosland and Bauer, 2017; Deacon, 2006; Deacon, 2012; Jackobson, 1977; Kohn, 2013, 2014; Sebeok 2001). Peirce's view on semiotics is inclusive of language and representation as sign relations in a broader sign-system that grant the human and non-human the same status, that is, of a sign (Crossland & Bauer, 2017). As such, life is semiotic (Kohn, 2013) and all its elements are signs that do not depend on discourse or representation to be perceived, but rather all the elements of life are understood as signs (Croosland & Bauer, 2017). Consequently, Peircean semiotics could complement the existing debate on the material–human couplet. More specifically, the theory could stretch the sociomaterial account beyond performativity without discarding representation (Crossland & Bauer, 2017) through permitting thinking on how the human and material emerge along with their different forms of agency, without limiting the process of signification to the human (CP 6.322).

5 DISCUSSION AND CONCLUSIONS

5.1 Theoretical contributions to strategy emergence

5.1.1 BI: From simulacra to sign

This dissertation strives to address three genres of modernist representations of BI—the technological determinist, humanist, and post-humanist treatments. I explore how the notions of reflection and reflexivity can be utilized to address and rehabilitate the meaning and the ontological status of BI in these accounts. In particular, I discuss how simulation and simulacra can be used to theorize a reflexive perspective on BI. Conceiving of BI as simulacra permits us "to reconnoiter new terrain beyond the reality of traditional conceptions" (Gephart, 1996b, p. 219; Pollner, 1991). Here, the new territory involves theorizing BI as "orders and processions" (Gephart, 1996b, p. 219) of technological simulacra. By purposefully discussing these as simulation, I seek to problematize the basic assumptions about the reality of BI and the social environment of strategizing, and also to explore how such assumptions form the practices that generate notions of BI and strategizing as "humanly accessible features of reality" (Gephart, 1996b, p. 219) pertinent to technology sustenance of strategy work.

Given that the organizational world now bears the stamp of BI and analytics, it can safely be said that there remain no strategy or organization phenomena unaffected by BI, to the extent that it is becoming a challenge to distinguish the real world from the BI simulated world. BI thus becomes simulacral (Baudrillard, 1983), in other words, it is "a representation of a true [organizational and competitive] environment that has somehow escaped us, a vision of a reality that vanished as we developed the temerity to examine it closely" (Gephart, 1996b, p. 220). Therefore, our scientific understanding and representations of the organizational and competitive environments are constructed "in terms of simulations: representations of pure, hypothetical phenomena for which no original exists" (Gephart, 1996b, p. 220). This reflexive view has some implications. First, by viewing BI as a simulacral social construction, I pinpoint the options for conceiving and re-conceiving various images of BI. That would not be possible if BI were theorized based on facts without taking humans into account (Gephart, 1996b, p. 221). In other words, reflexivity directs our attention toward the fact that humans have considerable leeway in constructing *the facts* of BI; more leeway than if BI were a matter of positivistic facts irrespective of humans. That degree of leeway imposes a duty to BI and its sustenance (Gephart, 1996b, p. 221). Second, this reflexive perspective contains "reflection and positivist science as phenomena to

be analyzed" instead of treating them as implied theoretical frameworks to extend strategy research. As such, BI and its analytics are considered endogenous to strategy research and are analyzed on reflexive grounds (Gephart, 1996b, p. 221). That is in contrast to treating BI as a "set of factual resources to be used," not explained and accounted for in strategy work (Gephart, 1996b, p. 221).

Overall, scientific reflection on BI attempts to investigate, to the furthest extent possible, the territory or milieu of BI, which is restricted by available knowledge. In other words, the task is to examine "the unknown and make it known" (Gephart, 1996b, p. 221). Endogenous reflexivity is concerned with questioning the limitations of such knowledge of BI and attempts to discover different maps of the domain, that is, to comprehend the frontiers of the known (Gephart, 1996b, p. 221). Radical reflexivity transcends the domain to reach the unknown, investigate it, and establish the boundaries that mark the start of the unknown areas (Gephart, 1996b). In providing the concepts of simulation and simulacra, Baudrillard (1986) offers us the means to create a reflexive illustration of this domain of BI by investigating the encounters of the human with BI and conceiving of this human–material contact as a simulacral relationship (Gephart, 1996b). Baudrillard's (1986, p. xx) thesis permits us to perceive the limitations of human signs and be able to recognize material (non-human) signs that extend to the furthest side of "an awareness of signs originating long before man appeared…among this gigantic heap of signs—purely geological in essence—man will have had no significance". What lies beyond human signs is another kind of sign that represents other signs in an ad infinitum sequence of signs, from which reality is produced and reproduced (Genosko, 1994). Radical reflexivity thus directs us to a world made of signs, and the only way to understand its meaning and functioning is to think of it as a matter of signs (Gephart, 1996b). Below, I outline the basis for this form of thinking that places BI and strategy emergence in the realm of signs beyond humans.

5.1.2 The wheel's hub

The Latin idiom "Ex nihilo nihil fit" asserts that there is no material thing that comes from nothing. The implication is that any material or energetic structure or process in the present follows something as substantial in its consequences (Deacon, 1996; 2012). As such, this proverb is the forerunner of today's first law of thermodynamics which suggests that any material or energetic structure or process cannot appear from nowhere or vanish into the abyss (Adkins, 1968). The law thus implies that any material or energetic structure or process is just a rearranged version of its predecessors, and therefore brute originality is a mere

fiction (Deacon, 1996; 2012). As a corollary, the more unique and complex a process or a structure is, the more probable it is the product of careful effort and smart planning to make it a good fit to its context (Deacon, 1996). This "fittedness" or "the tendency of things to fall into messiness" (Deacon, 1996, p. 112) is none other than the second law of thermodynamics that asserts that the degree of messiness and randomness entropy of spontaneous and isolated processes increases over time toward a balanced state where entropy peaks (Sandler, 2006). In his answer to his daughter's question, "why do things get 'untidy'?", Gregory Bateson (1972, p. 22-24) suggests that happens simply because the untidy ways are more than the tidy ones because the orderly ways, the tidy, are what we biased creatures hope happens and the disorderly untidy ones are all the infinite other ways that things will go toward. Therefore, when the unbiased force of nature is shuffling things, they are rearranged in terms of "all the possibilities regarding their relative probabilities of occurrence, and so the very miniscule domain of arrangements of things that are highly regular (or that we judge to be so) is often never sampled spontaneously and tends to become progressively more improbable over time" (Deacon, 1996, p. 112).

The two laws of thermodynamics seem to rule out the possibility that something absent such as "teleological processes, such as functional design, representation, and intentional initiation of action" could be a source of physical alterations, although these teleological processes hold a name in science "teleonomic" that denote that the functioning of certain apparatuses, like a thermostat, acts according to a purpose, yet the explanation of such an aim if defined in terms of physical and mechanical forces, which in turn excludes the possibility of representation and intentionality in human and physical action in favor of causal logic (Deacon, 2006, p. 112; Pittendrigh, 1958, p. 394). However, this causal logic is subject to reversal if we consider, for example, that the atoms that make our bodies were once passively scattered across the universe, and, at some point, will return to passively form air and dust (Deacon, 2006; 2012). Therefore, it seems logical that these atoms enjoy two disparate and dichotomous forms of existence—an animate one (when they combine to form our bodies) and an inanimate one (when they are passively scattered in the universe) (Deacon, 2006; 2012). Accordingly, the causality logic of 'thermodynamic tendencies' seems to invert when these inanimate scatted atoms come together to form an atypical animate collection that challenges the physical basis of causality in the change from inanimate existence to animate and from machine mechanisms to mind (Deacon, 2006; 2012).

Since the time of Aristotle, philosophers have developed a pluralistic understanding of the concept of causality that comprises four kinds of causes

whereby change occurs: if we use the example of BI, material cause defines the structure and process of BI; efficient cause is the designers and users modifications and upgrading of technologies and affordances to create the structure and the process of BI; formal cause is the scheme followed in this development process; and final cause is the purpose or intention of the process, that is, creating a system "for the sake of which" we understand what has happened, explain what is happening, and predict what is about to happen (Deacon, 2006, p. 113). To think of the intention as a future state that generates a present state, one needs to avoid approaching intention and the notion of *purposive agency* in terms of physical causality; otherwise, they will end up "pointing to an unopened black box." That risk arises because on physical grounds, only things conceived of as *push* factors can determine the how and why of change; as opposed to conceiving purpose as the *pull* factor of some future possibility that, in physical terms, lacks "the materiality to affect anything" because no orderly arrangements can emerge out of absence (Deacon, 2006, p. 114). The Chinese philosopher Lao-Tzu hinted at this kind of order out of absence in the eleventh verse of his classic text Tao Te Ching translated by Kari Hohne (2009): "Thirty spokes share the hub of a wheel; yet it is its center that makes it useful. You can mold clay into a vessel; yet it is its emptiness that makes it useful. Cut doors and windows from the walls of a house; but the ultimate use of the house will depend on that part where nothing exists. Therefore, something is shaped into what is; but its usefulness comes from what is not".

Accordingly, nothing becomes a particular kind of absence because the empty space that makes the wheel's hub in the previous quote is what creates the possibility for the thirty spokes to make up the wheel and its potential usage to emerge (Deacon, 2006). Emergence here is not related to the institution of new physical laws "with an increase in scale and the interaction effects that result" as exemplified by the Aristotelian phrase: "the whole is greater than the sum of the parts", which addresses this kind of novelty that surges through an "ascent in scale…[from]…interactions of composite parts…[whose implications]…generate a regularity" (Deacon, 2006, p. 122). Emergence here is about "constitutive absence" that emerges from the unusual circular connectivity of restrictions and influences, and allows "certain distributional and configurational regularities of constituents to reinforce one another iteratively throughout an entire system… it is the hole at the wheel's hub" (Deacon, 2006, p. 124-146).

5.1.3 A semiotic view on BI and strategizing

To understand the constitutive absence of the wheel's hub, one needs to think of it in terms of semiosis or experience, a non-deterministic inclination, a generative

tendency toward an ideal form that connects agents (Rosiek, 2018), or as Latour (2014) puts it: the French word 'sens', not to be confused with the English 'sense', but can be understood through the word 'inclination'. Suppose we were to reposition a vector that has a horizontal direction to the right (keeping the vector the same by not rotating it). In that case, the vector could have multiple directions but only two inclinations: above or below the horizontal direction to the right. This inclination is what Latour (2014) means by *sens* that represents the universal connector between human and material entities of life (Kohn, 2013; Bruno Latour, 2014; Rosiek, 2018). According to Peirce (1988), this inclination is a habit (human or material) that involves anticipation of future possibilities, that is, the Aristotelian 'esse in futuro' (see also Short; 2007; Rosiek & Snyder, 2018). Consequently, all elements of life (human and material) have an ideal (future) possibility, a *habit*, *tendency*, or *purpose* that shapes the becoming of their meaning (Short, 2007). For instance, the tendency to write with a pen shapes its materiality, in the same way, the tendency to produce a palm tree shapes the material form of a palm tree seed (Rosiek & Snyder, 2018). An office space has a tendency to organize strategy practitioners into the general form of a workshop, although the actual workshop will be a response to the interaction between the office space and the conditions imposed by the participants. BI and its analytics have a tendency to organize data into a certain form of patterns, although the actual pattern data adopt will be an outcome of the interaction of data and the human monitored analytical variables.

An office space is as much about what is inside the walls as the absence they delimit. Accordingly, certain strategizing practices depend on what the office space is as much as all excluded absences that it is not (Kohn, 2013). This absence, (*nothingness*) is immaterial, invisible, and constitutive of the semiosis process, akin to Lao-Tzu's metaphorical wheel that is useful owing to the hole at its hub (Deacon, 2012; Kohn, 2013). It is this constitutive absence at the hub of the wheel, delimited by its spokes, that gives rise to all the practices of the wheel (Deacon, 2012). This constitutive absence is not a material quality, it is a relation to a real which is not here as opposed to a real that is out there, which ignores the spontaneity of life, its tendency to emerge, not to mention its semiosis in which the human and material are nested (Bateson, 2000; Deacon, 2006; Kohn, 2013).

Limiting the real to what happens re-instigates the possibility of life into the mind, and does not account for how this mind could have emerged out of semiosis; nor does it account for how it relates to the semiotic chain in the human and material realms (Kohn, 2013). This *real* is what Peirce names *secondness* (CP 1.23, 26). The apple dropping on Newton's head is secondness insofar as it is a "shocking" (CP 1.336), "brutal" (CP 1.419), event that disrupts our habituality and pushes us to

think differently (Kohn, 2013; CP 1.336). However, Peirce does not limit the real to secondness, but extends beyond it to a much broader real that could encompass his semiotics and, therefore, a non-dualistic view of our existence in relation to spontaneity and emergence (Kohn, 2013). Peirce devises a triadic semiotic system for this endeavor, of which secondness is only one aspect. Firstness is the aspect that involves raw spontaneity, quality, feeling, in a vacuum, detached from anything else (Kohn, 2013; CP 1.304). Thirdness concerns the world's "tendency to take habits" of all entities in the universe, the tendency to have patterns, purposes, and regularities (Kohn, 2013; CP 1.409; CP 6.101). Thirdness does not occur in the mind, nor is it imposed by it; it is innate to the world: the generality that conditions semiosis (Kohn, 2013).

In the doings of strategy with BI, form patterns proliferate to an unprecedented degree in all directions, yielding what Boyd and Crawford (2012) refer to as *apophenia*, that is, seeing patterns where absence prevails. Form here is not a synonym of structure or domain, but is a process of pattern production and propagation whose innate generative logic comes to permeate humans as they harness it (Deacon, 2006, 2012; Kohn, 2013; Latour 2014). These patterns are significant in their absence, akin to the dog that did not bark, whose silence helped Sherlock Holmes solve the mystery of the racehorse that had disappeared. During the investigation, a police inspector asks Holmes whether anything caught his attention, to which Holmes replied: "the curious incident of the dog." The inspector replied: "the dog did nothing that night" Holmes: "that was the curious incident… had grasped the silence of the dog for one true inference invariably suggests others…obviously the midnight visitor was someone the dog knew well" (Doyle, 1894, p. 19–23). Floridi (2012) suggests that when these patterns are absent, that is probably also a curious incident akin to when data did not 'bark' prior to the subprime crisis of 2007–2009.

This form, constitutive in its absence, directs our attention beyond whatever emerges from the coupling of the BI and the human and toward that which is not visible to reveal the secret workings behind the manifestation of the visible. For instance, Pickering references Schivelbusch's (1986) railway journey, where the human experience of the train created a new emergent phenomenon, 'panoramic seeing' that was not possible prior to the encounter (2001). Through the description of the train journey, Schivelbusch (1986) reveals how the coupling of the human and train connected the traveler to new mental and bodily forms of a new subject, the *panoramic observer* beyond the object *train* (Pickering, 2001). Form is therefore an invitation to go beyond the visible encounter of the human and BI to understand what drives strategy to emerge.

Form propagates itself through the human and affects the logic of strategizing from within. Accessing it requires entering the logic of these patterns (Kohn, 2013). For instance, BI turns data into form when it aggregates it from its unstructured messiness, yet aggregated data flow into strategizing activities to point to reality beyond them at the price of compromising the rich and complex distributive data that high abstraction overlooks and therefore conveys dubious descriptions of reality (Constantiou & Kallinikos, 2014). Seeing distributive data does not imply a shift of perspective, but the ability to see form twice; for both aggregate and distributive data are two dimensions of the same entity: one is the inside of the other; either explains the other (Coutin, 2002; Riles, 2000). Therefore, the phenomenon at hand is not "outside" that is endemic to our encounters with material practices of strategizing, but is inherently "inside" the absent patterns of strategizing practice (Riles, 2000). As such, the forming patterns of strategizing practices are the effects of self-organizing selves (Deacon, 2006, 2012) and to practice strategizing on the terms of these form patterns, to enter their relational logic, to account for their constitutive absences, it is necessary to become attuned to their existence and self-organizing nature and attend to rendering these self-organizing selves accessible from within, that is to say, turning the patterns inside out akin to finding a vantage point from which one can attend to what seems too familiar to apprehend (Kohn, 2013; Riles, 2000).

This semiotic view of BI and the doings of strategizing re-conceptualizes causality through form and theorizes agency as a product of an absential and shared 'form' between the human and the material, from where the constitution of the doings of strategy ensue (Kohn, 2013). This form is neither cognitive nor material; it is an absential pattern resulting from constrained opportunity (Kohn, 2013). Therefore, the aim of future studies on BI and strategy, and by extension technology sustenance in strategy work, shall be the flushing out of this constitutive form (Kohn, 2013) bringing to the fore how its constraints on opportunity emerge in the doings of strategy with BI, and also the particular manner in which its patterns propagate and the ways in which they come to matter to practitioners of strategy (Kohn, 2013). If we were to display all the patterns generated by BI and its analytics and were to sketch the forms generated by the gaps between those patterns, we could create a new figure from the areas of absence formed by the spaces between the patterns. These shapes of absence are what future research on BI and technology sustenance in strategy work should seek to access by turning the patterns of form inside out (Riles, 2000).

5.1.4 A processual metaphysics

Conceptualizing BI and the doings of strategy as part of semiosis and theorizing the causality and agency whereby strategy the social emerges from BI material technologies (Kohn, 2013) as form presupposes a non-dualistic view of what strategy entails because the form does not fit the dualistic metaphysics that steer us into seeing causality as either a matter of push and pull mechanisms or of human desires or cognition (Kohn, 2013). Therefore, such conceptualization also requires an alternative position to substantialist metaphysics that inhibits strategy-as-practice and strategy process streams from satisfactorily reporting strategy emergence and re-instigates the macro/micro distinction that permeates both schools (MacKay et al., 2021).

According to Peirce, each sign produces another in an endless, processual, and dynamic chain of relationships between signs (Queiroz & Merrell, 2006; Keane, 2003; Crossland & Bauer, 2017). This processual dynamism can account for the historicity and contingency of BI as a sign without reducing it to the human context of discourse and linguistic representation or restricting it to a mediative role (Keane, 2003). By so doing, this processual dynamism is what dissolves the dualism between the human and BI for it views causality and thought as semiotic (Pickering, 2007), and therefore stretches the accounts of post-humanists beyond performativity without discarding representation (Crossland & Bauer, 2017). Similarly, it does not anchor the relationship of process and practices in micro and macro or process practice dualistic logics, but rather demolishes these very same dualistic distinctions to uncover "how local coping actions aggregate and congeal into broader socio-cultural practices that then provide the patterned regularities facilitating the possibility of strategy emergence and ultimately shaping organizational outcomes" (MacKay et al., 2021, p. 1346-1347). Therefore, processual dynamism turns the metaphysics of substantialism on its head and starts afresh. The result is a processual metaphysics that does not divide the micro and the macro levels of strategizing, nor does it separate the physical from the metaphysical, and therefore nor does it distrust the material and reduce it to its properties and affordances.

Although both schools differ in how they privilege what constitutes strategy formation, they both conjecture processes of reality instead of "process is reality" (MacKay, 2021, p. 1347-1349; MacKay and Chia, 2013; Rescher, 1996; Whitehead, 1978;1929). The premise that "process is reality" is the foundation of processual metaphysics and implies that process "is what makes practices an imperative in constructing social reality, and, therefore, to believe that "process is reality" propels us to understand practices as the chief way for "selectively fixing,

stabilizing and creating the social orders and institutions that we find all around us" (MacKay et al., 2021, p. 1349). Under this alternative way of viewing the nature and relation of process and practices, their associated distinctions—be they micro/macro or strategic/operational—fade away as they "enfold and unfold into each other. That allows us to "rethink strategy emergence as arising from the underlying patterned consistency of actions resulting from the propagation of socio-cultural practices" (MacKay et al., 2021, p. 1349; see also Bohm, 1980).

The foundation of processual metaphysics is based on reality being processual, which suggests that reality is in a constant state of flux where "everything flows, and nothing abides" and therefore, nothing is made but everything is in the making (MacKay, 2021, p. 1347; James, 2011;1909, p. 87). As such, it is our "socio-cultural" practices (Bourdieu, 2005) and linguistic intervention in this reality in flux that create "distinctions and categories", and what we come to know as our social entities. Whether, we as individuals or our institutions, those entities are not independent units, but "temporary, stabilized patterns… bundles of relations…and practices…forged from a manifold of changes…" (MacKay, 2021, p. 1347). This is not to reject the fact that substances are real, but rather to rethink things as "manifolds of process" (Rescher, 1996, p. 52).

A flowing reality is not necessarily one fit to live in (MacKay et al., 2021) for we as "social beings" need what Karl Weick (1979, p. 6) calls a "workable level of certainty" to develop a certain way of purposeful living. This is why we build "shared practices…[to]…help us construct our identities and the social orders that we then find so familiar and necessary" (MacKay et al., 2021, p. 1347). Therefore, practices, under processual metaphysics, are our "collectively shared and culturally embedded" modes of (re)considering, (re)making, (re)establishing, and thus bringing into existence "social entities, events, and structures" out of a flowing reality (MacKay et al., 2021, p. 1347; James, 1996; 1911; Whitehead, 1925, p. 68-69). Accordingly, practices are "aggregates of coping actions that have evolved through extended collective efforts at dealing with a fluxing reality" (MacKay et al., 2021, p. 1348). They are what allow us to mitigate the ambiguity of our "lived experience" via its methodical arrangement into a steady proxy social reality to which we react (MacKay et al., 2021; Weick, 1979). The progressive coalescence of different "local coping actions" into collectively accepted practices is what offers us the ability to develop distinctions "social entities" like "'individual' and 'environment', 'markets' and 'organization', 'resources' and 'assets', 'competitors' and 'competitive advantage', 'supplier' and 'producer', 'operations' and 'strategy'" (MacKay et al., 2021, p. 1348; Schatzki, 2005; 2006). All entities are fashioned and fortified via their practical application to the point that they subsequently emerge as self-evident things that demand to be dealt with as such and that we overlook

"that the very permanence of its form is only the outline of a movement" (Bergson, 1998/1911, p. 135) or "patterns in the flow of actions" (MacKay et al., 2021, p. 1348; see also Bohm, 1980).

A processual world view is "perfectly prepared to acknowledge substantial things but see them rather in terms of processual activities and stabilities" (Rescher, 1996, p. 52). The premise of *process is reality* also forms the basis of practice theory and its proponents stress that practices are "manifolds of actions that are ontologically more fundamental than actions" (Schatzki, 1997, p. 284). The rationale is that the practices form us, forge our modes of existence, and influence the way we think about and become involved with the external environment (MacKay et al., 2021, p. 1348; see also Bourdieu, 1977, 1990; De Certeau, 1984; Dreyfus, 1991). Actors, in contrast, are momentarily fixed "bundles of practices" (Schatzki, 2005, p. 466), "patterns of public comportments…sub-patterns of social practices" (Dreyfus, 1991, p. 151), and "carriers of collective practices" (Reckwitz, 2002, p. 256; MacKay et al., 2021, p. 1348). Stabilized distinctions like "'institutions', 'structures', 'organizations', 'markets', 'firms', 'strategies'" are therefore the product of the incremental congealing of "processual rather than successional" "socio-cultural practices" because these practices are a result of "recurrent" not "occurrent" process of developing the activities of "before" and preparing for "those that follow" (MacKay et al., 2021, p. 1348; Ingold, 2011, p. 53). Therefore, processual metaphysics shifts our understanding of practices from activities that *we do* (e.g., Burgelman et al., 2018; Jarzabkowski et al., 2007; Johnson et al., 2003; Whittington, 1996, 2006) to activities that *constitute us* (MacKay et al., 2021).

Taking the practice turn seriously behooves us to reconsider the different ways the "recurrent socio-cultural practices" cause strategy emergence to become possible and affect strategic goals by dismissing "methodological individualism" (MacKay et al., 2021, p. 1348) and circumventing "perennial discussions of the relative priority of individual agency and social or cultural structures" (Rouse, 2006, p. 645- 646). Resorting to practices, therefore, emanates from a strong urge and impulse to do away with the "micro/macro" dualism by rooting "macro social phenomena such as structure, culture, organization, firm, strategy" in the "firming-up" of "aggregate local micro coping actions into a pattern of accepted socio-cultural practices" (MacKay et al., 2021, p. 1348-1349; Schatzki et al., 2001). Rethinking practices as being our ways to attend to processual reality (Whitehead, 1929/1978) assists us in by-passing "the micro/macro, agency/structure, process/practice, operational/strategic" distinctions that haunt strategy scholars (MacKay et al., 2021, p. 1349). As such, practices are no longer concerned with the "internal life of process" (Brown & Duguid, 2000, p. 95) but with providing us with the necessary resources to develop "stability and the social orders" that make up

our reality and world in flux (MacKay et al., 2021, p. 1349). This alternative way of re-conceptualizing the relationship between process and practices helps us to rethink strategy emergence as a result of "the underlying patterned consistency of actions immanent in the inadvertent propagation of practices" (MacKay et al., 2021, p. 1349).

The alternative position I present here begins with the premise that reality is a process (Bergson, 1911/1998; James, 1909/2011; Whitehead, 1929/1978; MacKay et al., 2021), and conceptualizes practices as signs of "complex bundles of coordinated processes" (Rescher, 1996, p. 49). Practices are the perceptible imperatives of our social life (Bourdieu, 2005) that allow us to develop social distinctions (entities) or "islands of artificial stabilities" that offer us the raw material to form and maintain "social reality and the social orders" (MacKay et al., 2021, p. 1350) that become customary and essential. The transition occurs when we selectively combine and harmonize features of an ever-changing reality. Social distinctions can alter our understanding of "the pervasive socio-cultural backdrop influencing human behavior" by highlighting how "social or cultural structures" have objective reality or being only via their everlasting "reproduction in practices" to the extent that structure and culture are "abstract" manifestations of "underlying recurrent practices" (MacKay et al., 2021, p. 1350; Rouse, 2006, p. 646; Bourdieu, 1977; 1990). Therefore, it is not we individuals, or, for that matter, our discourses or institutions that produce practice, but the opposite is true; we are "effects of practices" (MacKay et al., 2021, p. 1350; see also Schatzki, 2005, 2006) that allow us to exploit the flow of reality to "drive it better to our ends" (James, 1911/1996, p. 65).

Practices establish the character and inclination of the constituents of a community to act in a shared way when confronted with the demands of a set of circumstances (Bourdieu, 1977, 1990; MacKay et al., 2021). Therefore, the actions of participants in strategy meetings or workshops have already been constructed by their "prior socio-cultural conditioning and by their extended immersion into an organization's modus operandi", which, in turn, makes the likelihood of strategy, along with its associated outcomes,emerging, an imminent event (MacKay et al., 2021, p. 1350; see also Bourdieu, 1977, 1990). Therefore, practices, from a processual metaphysics, are crucial to our comprehension of how social phenomena emerge, in particular the emergence of strategy (MacKay et al., 2021). In contrast to strategy-as-practice scholarship, which separates practices from "context and time" and unlike the process school that explores "realized strategy and processes" while overlooking its underlying "socio-cultural practices," the processual strand of metaphysics demonstrates "how socio-cultural practices, comprising a complex milieu of local coping actions that aggregate into a modus

operandi, are able to account for the inadvertent emergence of a coherent strategy without the latter ever being the 'product of a strategic orientation'" (MacKay et al., 2021, p. 1350; Bourdieu, 1977, p. 73). Practices comprise "patterns of regularities" constructed via reoccurring "coping actions" performed by a group of strategy practitioners at the intersection of the organization and the environment, and it is these very same patterns of regularities that, merely by accident, spur the emergence of strategy (MacKay et al., 2021).

Practices are ever-evolving, so much so that every time they become involved with coping actions, they are reformed and refined (MacKay and Chia, 2013) and thereby produce a "patterned regularity of responses" (MacKay et al., 2021, p. 1350; see also Bourdieu, 2005). Processual metaphysics dictates practices are to be examined in relation to the time dimension and within the socio-cultural context that influences practitioners' actions vis-à-vis situational exigencies (MacKay et al., 2021; Schatzki, 2001;). It is not practitioners as individuals who shape practices through their beliefs or principles, but they do become "socialized into…what it is to be a human being" by means of social practices (Dreyfus, 1991, p. 23; MacKay et al., 2021, p. 1350-1351). It is thus practices that direct individuals and wire them into going about situational demands through "the pattern of practice regularities" that underpins and produces the behavior and common sense of individuals and puts together the socio-cultural context of organizations (Schatzki, 2005, 2006; Bourdieu, 1990, p. 55; MacKay et al., 2021).

These "patterns of practice regularities" are spread, in a way that is understood or implied without being directly stated, organized as accepted "ways of engaging and of doing things" (MacKay et al., 2021, p. 1351) to formulate the strategic tendencies that are prone to arise as "patterns in a stream of action" (Mintzberg & Waters, 1985, p. 257). According to Mintzberg and Waters (1985, p. 257), these "patterns" are immanent, meaning they are "realized in the absence of/or despite intentions." They are emergent and thus differ from deliberate strategies that are "realized as intended" (MacKay et al., 2021, p. 1351). Interpreting conceptually emergent strategy as such has two implications: a) emergent strategy is depicted as taking place at the macro level instead of at the micro level alongside the routine activities and processes that produce it; b) the underlying process of emergence is conceptualized as a "black box" to the extent that while we can recognize realized strategy as higher-level output and deliberate and emergent strategy as lower-level input, we cannot discern the processual series of change that lead that generate the transformation from the lower level of input to the higher level of output (MacKay et al., 2021, p. 1351). The first implication (the conceptualization of emergence) reinforces the separation between the macro and micro levels, which practice theory dismisses as inadequate (Bourdieu, 1990; Dreyfus, 1991; Schatzki, 2005;

MacKay et al., 2021). The second implication (overlooking the process of emergence) reduces the notion of emergence to "a label for a mystery" that conceals the mechanisms and processual elements behind emergence and how such elements become apparent (Haldane, 1996, p. 265; MacKay et al., 2021, p. 1351).

In response, processual metaphysics surmounts these two issues by forming strategy into a concept that is "immanent in established social practices" (MacKay et al., 2021, p. 1351). Immanence here denotes "the latent potential of the tendencies or impulses that inhere within practices that find expression in their actualization" (MacKay et al., 2021, p. 1351). As such, the statement "olive trees are imminent in olive seeds" means that olives are a step in the process of development of a "moving organism" (MacKay et al., 2021, p. 1351) that, without interruption, moves "toward its eventual condition" (Rescher, 1996, p. 11) as an olive tree. The notion of immanence assumes that "tendencies and impulses" necessitate a state or conditions (in the case of the olive seed, hot but dry summer or mild but cool winters) to the advantage of their fulfillment, and therefore a strategy that is immanent comes into view in the process of its realization (MacKay et al., 2021). Immanence thus shifts our focus toward the distinctive "dynamics of socio-cultural practices" to better understand "what is going on" with a phenomenon (MacKay et al., 2021, p. 1351), whereas emergence directs attention toward the nature of something; "what is or is not" that is "the patterns, structures or properties" of a phenomenon (Goldstein, 1999, p. 58).

In contrast to the strategy process and strategy-as-practice traditions where strategy making, mainly deliberate and planned, is determined by what MacKay et al. (2021, p. 1351) term "autonomous actors' intentions," processual metaphysics acknowledges the role of practices as *the sources* of threads and patterns of actions that are formed into strategies without the intervention of "genuine strategic intention" (Bourdieu, 1990, p. 60). The idea of immanence is thus not an end in itself but serves as a basis upon which researchers can construct their explanations (MacKay et al., 2021). Put differently, immanence in the socio-cultural milieu is a predisposition, a modus operandi spread and promoted, without intention, via habitual and entrenched practices of individuals acting as a group. It is a certain nurtured sensitivity vis-à-vis the local milieu, a method of connecting with it, and a favored mechanism for becoming involved in and reacting to it that gives the impression of being plain or obvious (MacKay et al., 2021). This predisposition haphazardly warrants a level of confluence of ways to address the demands of any particular state of affairs that confronts a firm. It is this likelihood of confluence that renders possible the unintentional emergence of "coherent strategy" (MacKay

et al., 2021, p. 1352) without recourse to "deliberate intention" or planning on the part of strategy actors (Chia and Holt, 2009).

In the processual metaphysics sphere, efficacious practices are distinguished from inefficacious ones by the degree to which those practices "sensitize and enskill" the individuals belonging to the organization to uncover "the grain of the world's becoming" (MacKay et al., 2021, p. 1352) and to go along its path "while bending it to their evolving purpose" (Ingold, 2011, p. 211). This view enlarges the scope of the practice turn (Seidl & Whittington, 2014) and allows a modus operandi to produce immanent strategies that allow "agents to cope with unforeseen and constantly changing situations" (MacKay et al., 2021, p. 1352) without jeopardizing or veering away from the socio-cultural tradition of the firm (Bourdieu, 1990, p. 61). To understand practices as merely "the doings of practitioners" (Schatzki et al., 2001) is therefore to minimize the consequence of the practice turn. Processual metaphysics, in contrast, designates "how the seemingly inconsequential everyday practical coping actions taken at all levels of an organization inadvertently aggregate into a set of established practices that then shape its strategic predispositions and hence strategy emergence and organizational outcomes" (MacKay et al., 2021, p. 1352). Besides, processual metaphysics does not trivialize the significance of careful thought and deliberation in "coping actions and practices", but puts forward for consideration that the modus operandi, formed within the socio-cultural context, make strategy practitioners inclined to "acting in certain habituated ways when confronted with situation-specific circumstances" (MacKay et al., 2021, p. 1352). As a corollary, processual metaphysics shifts attention to the emergence of strategy via "local coping actions congealing into established practices" (MacKay et al., 2021, p. 1352) and as a result of that, according to Rescher (1996), points to the way "microcosm and macrocosm are coordinated, linked to one another in a seamless web of process" (p. 21) in order to produce business strategy and organizational targets;.

5.2 Managerial implications

Reflexive explorations are concerned with subverting the assumptions and grand narratives of scientific and literary texts and their meaning. Accordingly, reflexivity is recognized for providing strong theoretical implications at the expense of managerial contributions (Jarzabkowski & Spee 2011). Notwithstanding its reflexive account, this thesis provides implications for managers to help understand the nature of BI and the role of its sophisticated technologies in the emergence of strategy. The competitive environment of firms generates volumes of data that firms need to decipher to sustain their competitive

advantage. Besides, the age of COVID-19 has generated a prodigious amount of data about employees' work that companies need to analyze if they are to understand their employees' behavior. By themselves, tidbits of these volumes of data are of little to no value for firms unless terabytes of data particles are merged together and analyzed longitudinally to uncover patterns that can be compared and juxtaposed to create digital footprints. That involves the creation of mathematical models and representations of everything a firm knows about each entity in its organizational and competitive environment. The record must be continuously updated with new data and accessed to generate inferences and predications about the behavior of that particular entity (Leonardi, 2021). In this context, BI and its analytics deploy algorithms and complex computational models to turn data from the competitive and organizational environments into digital footprints that act as data representations of organizational phenomena and entities, which are then used to predict and shape organizational actions and strategic behavior.

Firms that invest in BI and analytics to collect and analyze data on organizational phenomena can develop efficient feedback loops for knowledge absorption and transmission across organizational units (Leonardi and Meyer, 2015). They can also account for strategy emergence when implementing their strategies (Neeley & Leonardi, 2018) and create a database of organizational knowledge on networks, practices, routines, and competences (Leonardi, 2015; Leonardi & Contractor, 2018; Leonardi). Such firms can also assess their assumptions regarding certain patterns and make rational predictions and strategic decisions about the future of organizational phenomena (Leonardi, 2021). As more firms use BI and analytics to make sense of noisy data they stockpile and convert first to digital footprints then to predictions, executives should address how such predictions can be incorporated into their decision-making and the strategic activity of the organization. A further isssue that executives must then address is how they can reveal the predictions to their organizational entities. That can be challenging, especially with predictions of behavior and routines and the implications of such choices. The final issue to be addressed would be the terms under which these predictions could instigate activities.

5.3 Limitations and future research

The emergence of third-order simulacra is an aspect of radical reflexivity that is beginning to display future potential (Gephart, 1996b; Grandy & Mills, 2004). Therefore, the theorizing of this dissertation is intended to encourage alternative future lines of inquiry about the nature of BI, technology, and strategizing and is

therefore associated with several limitations. First, data comprised scientific articles systematically retrieved from databases. Therefore, some articles may have been left out from the final samples because of the usage of different keywords, terminologies, concepts, or because those articles were published in other databases. Considering that the essays accounted for articles published up to December 2020, articles in press after this date may also have been overlooked.

Second, the reflexive account of BI is subject to the authors' own interpretations, and on the grounds of post-structuralist deconstruction, each scientific text reviewed mirrors the preferred reading of its authors. An article therefore begins by identifying its particular themes, not as an end but as a means to disclose *the points of rupture* where the text's constitutive elements unravel, only to pinpoint other *non-preferred readings* to question what is the familiar and certain meaning (Beath & Orlikowski, 1994; Watson & Wood-Harper, 1996; Willmott, 1994). Similarly, this dissertation represents the preferred reading of its author and might therefore invite another deconstruction and reflective and reflexive examination and a series of challenges to its form and content, ad infinitum (Beath & Orlikowski, 1994). Third, the broad and cross-disciplinary scope of BI, technology, and strategy and the vast amount of underlying assumptions, philosophical paradigms, and theories upon which each stream grounds itself make it the task of this dissertation to synthesize and deconstruct. That is a challenging undertaking, and therefore, this thesis may have overlooked or trivialized relevant divergences, dichotomies, and similarities between different views and perspectives that motivate the treatment of BI sustenance of strategy work. Similarly, the classifications, juxtapositions, and integrative treatments of scholars, theories, or streams can appear somewhat biased by the author's interpretations and ontological and epistemological preferences.

The purpose of this dissertation was not to offer an objectivist account of BI. The content represents an expressly stated reflexive perspective of the author. However, that is not considered a limitation under the philosophical tutelage of the linguistic turn (postmodernism) or the ontological turn (Peirce's realism) of this dissertation. Nevertheless, this thesis seeks to open new avenues of inquiry into an alternative view of BI and its relationship with strategy. Ultimately, this thesis focuses primarily on the theorizing of the simulacral BI and therefore invites authors to challenge its premises and apply and verify its theorizing empirically. First, the form constitutive in its absence is neither cognitive nor material; it is an absential pattern that results from constrained opportunity (Kohn, 2013). Therefore, it is a hard notion to attend to ethnographically because it is ephemeral and hidden from our standard modes of inquiry and does not have the tangible otherness of any ethnographic project (Kohn, 2013). Therefore, attending to form

is embarking on a project akin to an ethnographic observation of a phenomenon for which we do not possess a methodological tool to create a description (Riles, 2000). The phenomenon at hand is not *outside*, that is, endemic to our encounters with the material practices of BI, but is rather inherently *inside* the absent patterns of BI (Riles, 2000). Therefore, the method should aim to flush out this constitutive form and illuminate how the constraints on opportunity emerge in the doings of strategy with BI, the particular manner its patterns propagate, and the ways in which they come to matter to the practitioners of strategy (Kohn, 2013). Riles (2000) describes this project as finding a vantage point from which to attend to what seems too familiar to apprehend. This method should thus aim to reveal that the forming patterns of BI are the effects of the absence of self-organizing selves (Deacon, 2006; 2012), and future research should address rendering these accessible from within, that is, turning the patterns inside out (Riles, 2000).

Second, using the new conceptualization of BI as simulacra, scholars can apply the instantiation method that involves engaging with the data comprehensively at the micro-level and over time to identify how micro-level BI's constitutive absence evolves and becomes embedded at multiple levels of organization and yields strategy emergence (Kouamé & Langley, 2018). Instantiation is a perfect fit for empirical studies investigating BI's constitutive form because the method is grounded in practice theorizing. That theory holds practices constitute the social world (Schatzki, 2001), and the connection between micro-level processes and macro-level organizational outcomes is tacit and "virtually simultaneous" (Kouamé & Langley, 2018, p. 572). Therefore, scholars can adopt instantiation, with its embeddedness logic, to demonstrate how BI's form influences micro-processes and "directly instantiate or constitute the macro-processes through which the organization exists or is changing" (Kouamé & Langley, 2018, p. 572).

Many scholars use instantiation to show the role of communication in constituting organizations (e.g., Taylor& Van Every, 1999). The approach can also be used to outline a communicative theory of organizations (e.g., Kuhn, 2008) and display how personal behavior influences the performativity of strategy at the macro level (e.g., Kornberger & Clegg, 2011; Rouleau, 2005). Interviews are therefore not the best data collection technique for instantiation because the focus of observation here is "the practices that individuals engage in, but whose form they themselves might be unaware of and unable to articulate." The issue is that this type of practical knowledge is primarily tacit. That indicates the best method would be one that facilitates a researcher scrutinizing data to illustrate how specific practices make up macro-level phenomena (Kouamé & Langley, 2018, p. 572; Langley & Abdallah, 2011; Rasche & Chia, 2009; Rouleau, 2005). Candidates would include,

a deep-dive microscopic research design such as micro-analytical approaches like ethnomethodology, conversation analysis, and narrative and discourse analysis.

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Business Intelligence—Capturing an Elusive Concept

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Introduction

In their search for competitive advantage, company executives' need improved real-time knowledge with regard to their internal organization and external business environment to rapidly adapt to changing circumstances (Howson 2014). That means companies need improved business intelligence systems to deliver optimal strategic decision making. However, firms have faced increasing challenges in trying to utilize business intelligence (BI) systems to deliver effective acquisition, assimilation, and implementation of knowledge. While producing endless amounts of data, companies face challenges

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in assimilating and exploiting data in strategic decision making. In addition, previous research has examined the impact of environmental (Ebrahimi 2000; Boyd and Fulk 1996), organizational (Ramakrishnan et al. 2012; Yasai-Ardekani and Nystrom 1996; Maltz and Kohli 1996; Qiu 2008), and managerial antecedents (Cho 2006; Elbashir et al. 2011; Babbar and Rai 1993) on business intelligence. The fragmented nature of BI research, however, leads to research focused on the operational and the tactical level (Li et al. 2008; Qiu 2008; Fleisher et al. 2008). Such research flags technological changes and not only tends to emphasize best practice, but also tends to overlook the strategic dimension (Li et al. 2008; Qiu 2008; Fleisher et al. 2008).

Moreover, the extant literature is a mixture of overlapping, if not competing, concepts: environmental scanning; the Executive Information System (EIS); competitive intelligence (CI); and BI. The proliferation of such concepts fosters discrepancies between the intelligence needed and that offered, and exacerbates the challenge associated with the measurability of the added value of the intelligence. To date, there is little or no evidence confirming the usage of any intelligence process capable of providing measurable, actionable intelligence that bolsters executives' strategic decision making. To develop managerial insights from the existing business intelligence research, the present chapter reviews the existing literature on business intelligence and thereby improves our understanding of the matter.

Theoretical Foundation

The business intelligence literature is multidisciplinary in nature. The inception of BI can be traced back to environmental scanning (ES) grounded in the strategic management research (Hofer 1978), competitive intelligence dominated by the marketing discipline (Wright et al. 2009; Dishman and Calof 2008), and the EIS drawn from decision support systems pegged to information management (Singh et al. 2002; Leidner et al. 1999; Walters et al. 2003). During the 1970s and 1980s, environmental scanning dominated the field until it was overshadowed by competitive intelligence. With the advent of the

internet, research on business intelligence was built around the concepts of Executive Information System and Decision Support system, before it was replaced by the specific term BI following the suggestion of Howard Dresner in 1989.

Traditionally, environmental scanning was the first link activity through which firms could comprehend their environment and remain on top of any changes (Hambrick 1981). Because firms' actions are constrained by their external environments (Brownlie 1994), the sustainability of competitive advantage hinges on the monitoring of events occurring in the external environment. However, the information collected through environmental scanning is not valuable unless it is matched with a thorough evaluation and analysis. Consequently, the competitive intelligence research stream adopted a four-phase process (comprising planning, collection, analysis, and dissemination) to identify, examine, evaluate, and communicate intelligence to decision makers (Wright et al. 2009; Dishman and Calof 2008). Nevertheless, both environmental scanning and CI schools of thought overlooked the internal analysis of a firm. The external environment, with its opportunities and threats, captivated scholars of both streams and overshadowed the appraisal of firms' internal strengths and weaknesses. Upon the emergence of the EIS in the late 1980s, executives were able to retrieve internal and external information through BI technologies that swiftly became capable of integrating large volumes of multisource data and providing intelligence for an organization's decision makers (Turban et al. 2010; Chaudhuri et al. 2011). Subsequently, BI would constitute a new research stream motivated by the development (and upgrading) of what are commonly referred to as BI applications or technologies.

Delineating the Business Intelligence Concept

Based on the selected literature, Table 1 provides a summary of the definitions associated with each concept. Though such concepts are considered separately within the collected literature, addressing the complementarity between the four strands of research is a sound contribution of this chapter.

Table 1 Definitions of the four concepts of BI

Concept	Definition	Authors
Environmental scanning	The *acquisition of information* regarding the happenings in the external environment of a firm.	Lau et al. (2012), May et al. (2000), Wei and Lee (2004), Fabbe-Costes et al. (2014), Ebrahimi (2000) and Cho (2006)
Competitive intelligence	A *process of* intelligence creation involving planning, information collection, analysis, and dissemination of intelligence which is the *product* that CI represents.	Calof and Wright (2008), Liu and Wang (2008), Fleisher (2008), Xu et al. (2011), Mariadoss et al. (2014) and Fleisher et al. (2008).
Business intelligence	A *process* that transforms internal and external data into knowledge and communicates it to the business user via a set of *applications.*	Ramakrishnan et al. (2012), Cheung and Li (2012), Moro et al. (2015), Elbashir et al. (2011), Popovič et al. (2012) and Zheng et al. (2012)
Executive information System	A *computerized system* that provides data access and analysis capabilities to executives.	Singh et al. (2002), Leidner et al. (1999) and Walters et al. (2003)

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Environmental Scanning

The available definitions illustrate a shared conceptual meaning regarding the nature of environmental scanning as an activity that ends once the external information (i.e., on the market, competitors, customers, suppliers) has been collected. The purpose of this concept—also known as peripheral sensing or peripheral vision—is to assist executives to proactively scan a rapidly shifting environment (Lau et al. 2012; Wei and Lee 2004; Cho 2006; Fabbe-Costes et al. 2014). However, the lack of a comprehensive framework to effectively depict shifts at the periphery combined with the bounded rationality of executives renders

environmental scanning a complex task (Haeckel 2004; Fabbe-Costes 2014). In the absence of a formal rational mechanism to interpret the events surrounding organizations, environmental scanning will inevitably involve a subjective evaluation influenced by executives' cognitive systems. Paradoxically, studies, herein, focused more on the influence of environmental uncertainty on executives scanning behavior, rather than the factors explaining and regulating such uncertainty (Haeckel 2004; Fabbe-Costes 2014). On the other hand, environmental scanning was repeatedly presented as an activity generating information appropriate for input into the strategy formulation or decision-making process (Lau et al. 2012; May et al. 2000; Wei and Lee 2004; Ebrahimi 2000; Cho 2006; Fabbe-Costes 2014). Notwithstanding its paramount importance, environmental scanning is not apt when reality sets in, for piles of data lacking appropriate analysis are undoubtedly unhelpful. To date, environmental scanning is yet to be associated with proper analysis heuristics that ensures data manipulation to deliver enhanced real-time decision making (O'Reilly and Tushman 2002; Brown 2004).

Competitive Intelligence

A look at the CI literature reveals a multifaceted concept rooted in environmental scanning (Calof and Wright 2008). Albeit eclectic, the definitions of CI distinguish between two research streams: CI as a product and CI as a process. The former regards CI as the intelligence product or knowledge relating to both the remote and task environment delivered to the business user (Slater and Narver 2000; Zheng et al. 2012; Xu et al. 2011); the latter considers it as a sequential activity through which intelligence is funneled to support organizational objectives (Wright et al. 2009; Dishman and Calof 2008; Liu and Wang 2008; Fleisher 2008). In reality, such distinctions merely benefit the researchers' purpose. If viewed as a product, the generation of ready-to-use CI, from open or human sources, becomes the center of the debate; if viewed as a process, attention shifts toward the transformation of acquired information into usable intelligence. As such, this research stream stresses the necessity of analysis; yet, for the most part, it remains prescriptive.

Executive Information Systems

The computerized decision support system (DSS) that CI analysts use to collate the intelligence requested by executives prompted the design of an EIS to retrieve information on internal operations and the business environment (Leidner and Elam 1993). That said, the definitions of EIS found in the literature reveal a consensus among scholars vis-à-vis the nature and purpose of the DSS that ensures a two-way flow of information from subordinates to executives and vice versa, via a cross-organizational-integrated technology and customized user interfaces (Volonino et al. 1995; Belcher and Watson 1993; Walters et al. 2003). This system supports executive decision making with multisource data in a textual, graphical, or tabulated format through a user-friendly interface. This research seems focused on the EIS's graphical display and rapid access to consolidated external and internal data as opposed to the EIS underpinning technology that is still deemed intricate for the executive: the sole receiver of intelligence (Walters et al. 2003; Belcher and Watson 1993).

Business Intelligence

It is worth highlighting the distinction between a system and bundle of technologies revealed by the study of the BI literature. Albeit BI technologies occupy a considerable part of the extant body of knowledge, it seems that a scholar's background—most being from the computer science or information management fields—influences the choice of perspective used to describe BI. The concept has been presented as comprising joint applications necessitating constant upgrading to overcome the challenges posed by the advent of Web 2.0 (Chen et al. 2012, 2002; Srivastava and Cooley 2003; Chung et al. 2005; Chau et al. 2007). In this context, most research appears oriented toward the technical issues related to the rising volume and complexity of data that challenges BI applications. That said, rather than evaluating the BI performance based on meeting the firm's requirements and the business users' needs (Lin et al. 2009), the common trend was the evaluation of proposed upgrades or prototypes, along with a customer satisfaction survey (Srivastava and Cooley 2003; Chung et al. 2005; Chau et al. 2007).

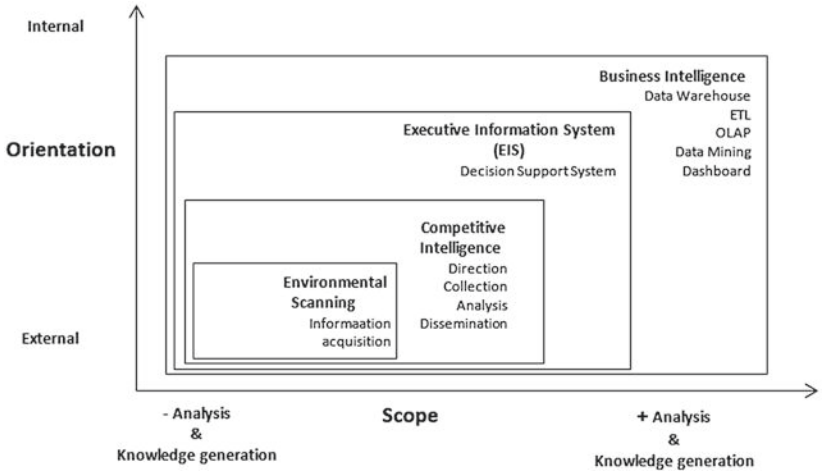

Fig. 1 BI domain (adapted from Fleisher and Bensoussan 2003, 2007)

Toward a Unified Definition of Business Intelligence

Although the foregoing literature generated overlapping concepts, there seems to be no holistic view linking the four related yet detached BI constructs. An overarching perspective on BI is illustrated in Fig. 1, where the BI domain is elucidated via two dimensions: environment and knowledge generation. The first level of BI encompasses environmental scanning externally oriented with rare analysis. This latter is part of the CI sphere and responsible for the scrutiny of the collected external information and intelligence dissemination, although it suffers from the lack of clear heuristics. On the other hand, EIS appears as the third level of BI, supporting the decision-making process with ease of access to both internal and external data. Finally, the BI concept that we introduce in this chapter is an all-embracing construct that comprises all of the above-mentioned concepts as sophisticated applications, not overlapping terms, to ensure real-time analysis and handling of multisource data to support real-time decision making.

To summarize, a careful scrutiny of the literature identified four research streams based on the conceptual approaches chosen by scholars to explore firms' BI-oriented practices, prescribe the optimal BI processes,

or dwell on the technical pitfalls and potential benefits of the BI system. Such a fragmented and operational-oriented body of knowledge draws from an overlapping set of definitions related to four concepts that form the strands of the BI research: environmental scanning, competitive intelligence, the executive information system, and business intelligence.

Hereafter, this chapter uses the four concepts listed above interchangeably to constitute a comprehensive definition of BI that embraces the interdependence between environmental scanning, CI, EIS, and BI. Accordingly, BI is defined as a system that uses computerized applications to collect, cleanse, store, and analyze internal and external data before they are transformed into substantive intelligence that is communicated to business users to support strategic and tactical decisions.

Future Outlook

Today, business intelligence provides executives with the necessary technologies (data warehousing, online analytical processing (OLAP), data mining, extract-transform-load (ETL), dashboards, and user interfaces) to access a huge volume of unstructured data in a timely manner. The optimal usage of these loads of data is left in the hands of the business user, who often feels overwhelmed by the volume of information and confused by the complexity of BI terminology, only to realize later that BI over delivers in collecting data and under delivers in answering executives' queries.

Gartner (2016) claims that the caution and skepticism around business intelligence is noticeably hampering the investment in business intelligence software that is becoming absolutely vital in the face of intensifying digitization.

It should then be no surprise that BI topped the Chief Information Officers (CIOs) priority list in the Gartner (2016) CIO agenda survey. It is a position BI has occupied for five years now and the situation seems unlikely to change anytime soon as CIOs reported; in the same survey, they expected their firms' digital revenues to increase to an average of 37% of the total revenues during the subsequent five years. If this expectation proves correct, servers will be flooded with data demanding

conversion to valuable actionable intelligence. Although this logic explains business intelligence topping a CIO's list of priorities, it draws attention to a salient aspect of this equation: the transformation of data to actionable intelligence, which in turn closes the gap between executives' expectations and reality and delivers the desired return on the investment in business intelligence technology.

Furthermore, the IDC's digital universe study 2020 revealed that the amount of data deemed useful by executives did not exceed 20%, whereas no more than 5% was actually exploited. This surprising fact points to massive volumes of data being lost every year in the digital universe that companies could have benefited from to boost their return on investment. According to a study conducted by the University of Texas at Austin, a 10% increase in the usability of data could translate to $2.01 billion of incremental revenue. Similarly, a study conducted by Brynjolfsson et al. (2011) from the Massachusetts Institute of Technology (MIT) suggests that data-driven decision-making can add 4% to an organization's productivity and 6% to its profitability. Although alarming, this correlation clearly ascribes a significant monetary value to the proper analysis of data, which to date remains by far the most significant bottleneck hindering the spread of business intelligence. This in turn engenders frustration among executives, as exemplified by only one in four respondents to a Domo and Businessintelligence.com (2013) survey stating that information in their reports met their expectations, while only 9% asserted their reports contained factual actionable intelligence.

In the midst of it all, 30 years of research turned out quantity of papers seeking new ways for optimizing technologies capable of integrating unstructured and structured data, which unless they are analyzed cannot offer support to decision makers.

Gartner (2016) estimates the business intelligence market amounted to $16.9 billion in 2016 and is predicted to grow at a steady annual rate of over 5%. Ultimately, investing in state-of-the-art technologies to elicit meaning from internal and external data is necessary for companies to succeed in today's tumultuous environment. However, if executives decide such technologies are no longer an efficient means to deliver competitive advantage, the continuous investment in updating and developing the BI arsenal will eventually cease.

Conclusion

In today's business environment, where the sustainability of competitive advantage is a moving target, room for intuition is shrinking as the need for rational predictability is growing. Data lacking proper analysis can generate no value, and sadly the International Data Corporation (IDC) predicted in 2014 that many firms will continue to waste 80% of the data they collect with the current business intelligence software. The IDC (2014) does, however, also suggest that organizations that incorporate diverse analytical tools and harvest data from a variety of sources enjoy a project success rate five times higher than firms that do not. To date, executives still face the challenge of discrepancies between needed and offered intelligence, and must address the issues surrounding the measurability of the benefits/costs associated with its implementation. This chapter argues that this state of affairs is due primarily to the choice of disparate definitions that lead to a fragmented literature, which continues to overlook strategic thinking. Despite its eclecticism, the BI research is far from exhaustive. With its roots in environmental scanning and branches in competitive intelligence, the available BI literature contributes to the enrichment of our knowledge of BI; yet it collapses under scrutiny of its strategic outcomes. This chapter, therefore, endeavors to direct scholars' attention to the strategic role BI should play to justify its cost. This chapter sheds some light on how the field is developing, and should encourage researchers to adopt an overarching view of BI that facilitates real-time decision making and strategic learning (Mintzberg and Lampel 1999) through a practical user interface.

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35 years of research on business intelligence process: a synthesis of a fragmented literature

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Abstract

Purpose – The business intelligence (BI) research witnessed a proliferation of contributions during the past three decades, yet the knowledge about the interdependencies between the BI process and organizational context is scant. This has resulted in a proliferation of fragmented literature duplicating identical endeavors. Although such pluralism expands the understanding of the idiosyncrasies of BI conceptualizations, attributes and characteristics, it cannot cumulate existing contributions to better advance the BI body of knowledge. In response, this study aims to provide an integrative framework that integrates the interrelationships across the BI process and its organizational context and outlines the covered research areas and the underexplored ones.

Design/methodology/approach – This paper reviews 120 articles spanning the course of 35 years of research on BI process, antecedents and outcomes published in top tier ABS ranked journals.

Findings – Building on a process framework, this review identifies major patterns and contradictions across eight dimensions, namely, environmental antecedents; organizational antecedents; managerial and individual antecedents; BI process; strategic outcomes; firm performance outcomes; decision-making; and organizational intelligence. Finally, the review pinpoints to gaps in linkages across the BI process, its antecedents and outcomes for future researchers to build upon.

Practical implications – This review carries some implications for practitioners and particularly the role they ought to play should they seek actionable intelligence as an outcome of the BI process. Across the studies this review examined, managerial reluctance to open their intelligence practices to close examination was omnipresent. Although their apathy is understandable, due to their frustration regarding the lack of measurability of intelligence constructs, managers manifestly share a significant amount of responsibility in turning out explorative and descriptive studies partly due to their defensive managerial participation. Interestingly, managers would rather keep an ineffective BI unit confidential than open it for assessment in fear of competition or bad publicity. Therefore, this review highlights the value open participation of managers in longitudinal studies could bring to the BI research and by extent the new open intelligence culture across their organizations where knowledge is overt, intelligence is participative, not selective and where double loop learning alongside scholars is

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continuous. Their commitment to open participation and longitudinal studies will help generate new research that better integrates the BI process within its context and fosters new measures for intelligence performance.

Originality/value – This study provides an integrative framework that integrates the interrelationships across the BI process and its organizational context and outlines the covered research areas and the underexplored ones. By so doing, the developed framework sets the ground for scholars to further develop insights within each dimension and across their interrelationships.

Keywords Business intelligence, Literature review, Synthesis, Process, Antecedents, Outcomes

Paper type Literature review

Introduction

The business intelligence (BI) process research has grown exponentially during the past three decades into a fragmented state drawing from a diverse set of studies with widely different contributions (Talaoui and Kohtamäki, 2020). Although this pluralism is necessary for the BI process research to generate momentum from insightful findings, it can yield a disjointed theoretical progress if it lacks proper literature reviews that uncover what is already known and set a direction for the way ahead (Hart, 1998; Rowe, 2014). Unfortunately, extant reviews of the BI process research still focus on the scheme that BI follows to provide actionable intelligence for organizations to act upon (Jourdan *et al.*, 2008) rather than the context where this process occurs and guide organizations (Bingham and Eisenhardt, 2011; Loock and Hinnen, 2015). For instance, the stock of previous reviews on BI research focused on its attributes and conceptualization (Ekbia *et al.*, 2015), its methodologies and research strategies (Jourdan *et al.*, 2008), its application to operations models (Roden *et al.*, 2017), its contribution to business value (Trieu, 2017) or decision-making (Mora *et al.*, 2005), its dimensions and taxonomy (Holsapple *et al.*, 2014), its usage (Watson and Wixom, 2007), its field development (Arnott and Pervan, 2005, 2014; Toit, 2015), its attitudes (Rouach and Santi, 2001), its characteristics and applications (Chen *et al.*, 2012; Eom and Kim, 2006; Moro *et al.*, 2015), its technologies and challenges (Shim *et al.*, 2002; Sivarajah *et al.*, 2017) and its trends (Watson, 2009).

To this date, no literature review has examined the BI process and its interrelationships with the organizational context. To address this gap, our paper synthesizes the body of knowledge of the BI process to discern patterns of the interrelated relationships of its characteristics, and its context, i.e. antecedents and outcomes (Hutzschenreuter and Kleindienst, 2006; Rajagopalan *et al.*, 1993; Van De Ven, 1992). We follow other scholars' conceptualization of BI process as an integrative sequence that encompasses the collection, transformation and usage (Chen *et al.*, 2012; Davenport and Paul Barth, 2012; Trieu, 2017) that occurs in an organizational context, exerts an influence upon it and is shaped by its antecedents (Bingham and Eisenhardt, 2011; Loock and Hinnen, 2015).

To capture the BI process within its context, we follow the process framework of Hutzschenreuter and Kleindienst (2006), Rajagopalan *et al.* (1993) and Van De Ven (1992) for it allows to position the BI process within its organizational context and explore their interrelated linkages. In this vein, we purposefully follow Levy and Ellis (2006) and Webster and Watson (2002)'s "effective methodology" of conducting systematic reviews in cross-disciplinary research such as the BI process body of knowledge and adheres to its processual scheme to select 120 articles published in top tier ABS ranked journals that we synthesize and integrate drawing from the process view framework that emphasizes the role of organizational context (Hutzschenreuter and Kleindienst, 2006; Rajagopalan *et al.*, 1993; Fischer *et al.*, 2016; Vaara and Lamberg, 2014). By so doing, we seek to synthesize the

contributions of prior studies on the BI process and its organizational context and pinpoint to gaps in linkages across the BI process, its antecedents and outcomes for future researchers to build upon. The paper begins with a detailed explanation of our systematic method, then presents our synthetic review and concludes with research gaps for further studies.

Methodology

We follow the systematic review scheme of Levy and Ellis (2006) to offer the BI research in particular and IS field what Webster and Watson (2002, p. 14) refer to as "effective methodological review". According to Levy and Ellis (2006), an effective review should justify its contribution to a body of knowledge being reviewed, synthesize quality research and present a sound research framework and systematic papers' selection method. Our choice of Levy and Ellis (2006)'s systematic review scheme is twofold:

- It addresses the peculiar and cross-disciplinary nature of the IS research in general and the BI body of knowledge in particular.
- It follows a process protocol of literature reviews that fits our process perspective of integrating the BI body of knowledge.

Following Levy and Ellis (2006), a high-quality input yields a high-quality output if it adheres to comprehensiveness, quality and relevance inclusion criteria. To ensure comprehensiveness, we go beyond the IT contributions on BI and extend our search scope beyond one database to capture all fruitful work regardless of its inherent discipline (Levy and Ellis, 2006). We, therefore, use four scientific databases, reputable among scholars of management, marketing and information management fields, namely, ABI/Inform, EBSCO academic search elite, EBSCO business premier, Emerald journals (Levy and Ellis, 2006; Webster and Watson, 2002). We conducted a pilot search of keywords in the aforementioned databases with two keywords, namely, BI and competitive intelligence. The intention of this trial was to gather all keywords related to both concepts. In total, 26 keywords were deemed appropriate for this review. Boolean operators ("AND" and "OR") and the asterisk "*" wildcard were used to concatenate the keywords set to generate multiple query strings that returned 11,745 hits across the four databases from 1985 through 2020 as Table 1 depicts. We selected 1990 as a starting year of our search as it represents the inception of BI (Chen *et al.*, 2012; Davenport *et al.*, 2001). A first scrutiny of the hits sought the elimination of duplicates shrinking the set of papers to 780 including conference papers, which we excluded because their research rigor is inferior to top journals and are not subjected to a rigorous peer review process (Culnan, 1978; Levy and Ellis, 2006; Webster and Watson, 2002). Besides, the high quality input criterion Levy and Ellis (2006) and Webster and Watson (2002) impose limits our sample to articles published in high quality peer reviewed journals of a reputable ranking because they are likely to contain the major contributions we ought to deal with to ensure rigor and leading theoretical discussions on BI (Levy and Ellis, 2006; Vogel, 2012; Webster and Watson, 2002). Therefore, we chose the ABS journal ranking because it offers an extensive cross-disciplinary list that is corroborated by a documented hybrid and iterative ranking process based upon peer reviews, peers' consensus and citations (Mingers and Willcocks, 2017; Morris *et al.*, 2009), which, in turn, offers us a credible guide that we can gauge papers against with confidence (Levy and Ellis, 2006; Morris *et al.*, 2009; Webster and Watson, 2002). This high-quality criterion reduced our sample to 290 articles whose abstracts we read and evaluated against our relevance criterion that, based on the research gap and motivation, deems only articles addressing BI process, antecedents or outcomes relevant to the review at hand. This step reduced the sample to 113

MRR

Search strings	
TITLE-ABS-KEY (“business intelligence” OR “business intelligence model*” OR “competitive intelligence” OR “market intelligence” OR “executive information system*” OR “decision support system*” OR “business analytic*” OR “data mining” OR “data*warehous*” OR “online*analytic*processing” OR “extract*transform*load” OR “environment* scanning” OR “customer intelligence” OR “environment* analy*i*” OR “finance* intelligence” OR “structured query language” OR “relational database management system*” OR “data mart” OR “data discovery” OR “dashboard” OR “process mining” OR “complex event processing” OR “prescriptive analytics” OR “predictive analytic*” OR “big data” OR “big data analytic*”)	
ABI/INFORM	9,927
EBSCO ACADEMIC SEARCH ELITE	270
EBSCO BUSINESS PREMIER	1,192
EMERALD JOURNALS	356
Total hits	11,745
Minus duplicates	780
ABS top tier journals	290
Articles addressing BI process, antecedents or outcomes	113
Backward referencing	plus 7
Final sample	120

Table 1.
Systematic selection process of the articles

articles that contain one or several linkages to the BI process, antecedents or outcomes. To verify the comprehensiveness of our sample and prevent the exclusion of any older and relevant contribution, we conducted a backward search that consists of reviewing the reference lists in our final set of papers to identify any work that our time frame criterion might have excluded and/or that our databases search might not have revealed (Bandara *et al.*, 2015; Levy and Ellis, 2006; Müller and Jensen, 2017; Thennakoon *et al.*, 2018; Webster and Watson, 2002). Our backward search analyzed each title in the reference lists of the 113 articles and identified 7 seminal works published prior to 1990 such as El Sawy (1985) and Ghoshal and Kim (1986), which, in turn, extended our final sample to 120 articles. We gauged the census of this review complete when no new concepts or relationships were identified in the literature set (Levy and Ellis, 2006; Webster and Watson, 2002).

A synthetic framework of the business intelligence process

According to Levy and Ellis (2006) and Webster and Watson (2002), a good literature review offers a complete census of its synthesis and follows an analytical framework to structure the body of knowledge it deals with. As a corollary, we followed the process linkage exploring framework of Hutzschenreuter and Kleindienst (2006) and Rajagopalan *et al.* (1993) because it emphasizes the role of organizational context (Vaara and Lamberg, 2014) and the mediating mechanisms that reveal the causality between antecedents and outcomes (Fischer *et al.*, 2016). We coded all articles using a two-digit key (01–120) that we plotted in Table 2 to provide summaries of the studies. Our thorough review of the 120 articles revealed shared patterns along which three streams were discernable, namely, antecedents, BI process and outcomes. In addition, our analysis revealed that each article focused on different interrelationships across the organizational context of the BI process. For the sake of comprehensiveness and in-depth analysis, we marked each article with a linkage code composed of a letter designating the contextual domain [(1) antecedents; (2) BI process; and (3) outcome] and a number that refers to the factor responsible of the relationship between contextual domains:

Table 2.
Linkage-exploring review matrix

No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
1	Calof and Wright (2008)	Marketing International business	–	Bibliometric assessment	B-I–B-I	Intelligence collection draws from the environmental scanning and strategic management fields
2	Wright and Calof (2006)	Marketing International business	Canada: technology UK: manufacturing Europe: industrial chemical	Existing studies comparison	B-I–B-I	Three studies measured intelligence collection activity with different measures and different foci, different sample frames and different questions, yet they all attempted to measure the same thing. The result is a set of differences and similarities difficult to generalize
3	Zajac and Bazerman (1991)	Management Organization Strategy	–	Previous empirical findings	B-I–C-III	New business entry failures and acquisition premiums are often the result of biases or blind spots in BI acquisition
4	Ramakrishman *et al.* (2012)	Business Information systems	Large firms US BI professionals	Survey	A-I–B-II A-II–B-II	Institutional pressures lead organizations to implement BI analytics for consistency. Organizational transformation requires BI analytics to adopt a comprehensive data collection strategy
5	Singh *et al.* (2002)	Management Decision support Information systems	North America	Questionnaires	B-III–C-I	BI fulfillment supports operational objectives and the strategy implementation phase
6	Trim and Lee (2008)	Management Marketing	–	Literature review	B-I–C-IV C-IV–C-II	Intelligence acquisition ought to be incorporated into the strategic intelligence effort through a resilience framework
7	Daft *et al.* (1988)	Management Organization Strategy	50 US manufacturers	50 personal interviews with executives	A-I–B-I C-I–B-I	Executives increase the frequency and scope of scanning in an environment with high uncertainty. CEOs in high performing firms scan more frequently and more broadly than low performing ones
8	Babbar and Rai (1993)	Management	–	–	A-I–B-I A-II–B-I B-I–B-I	New contextual approach:environment: heterogenuous/organizational: prospector. New scanning characteristics:purpose/intent: strategic/orientation: proactive

(*continued*)

Table 2.

No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
9	Liu and Wang (2008)	Management	Commercial bank	Literature review	B-I–B-I	A mathematical model, for services business, that uses modules for forecasting performance ratios. Its accuracy depends on the quality of collected data
10	Ghosal and Westney (1991)	Management strategy	Three MNC's: general motors/Eastman Kodak/British Petroleum	40–70 semi-structured interviews	B-I–B-I B-I–C-III	A significant gap between information needed and collected. Intelligence collection can benefit the organization in decision-making, sensitization, legitimation and inspiration
11	Gilad and Gilad (1986)	Management	–	–	B-II–B-II	Formal BI support unit at the corporate level- rather than the centralized or the decentralized one- to support BI function at the BU level
12	Bernhardt, 1994	Management	Europe/USA: pharmaceuticals/ cleaning	Case examples	B-I–B-I	The collection phase is the first phase of the BI process that feeds planning and direction
13	Ghoshal and Kim (1986)	Management strategy	South Korea A trading company	Case study Survey	B-II–B-II	A formal unit does not guarantee the effectiveness of the business BI system. BI should be a comprehensive system for usable intelligence during decision-making
14	Prescott and Smith (1987)	Business strategy	Sheller-Globe, INC	Field research involving	B-I–B-I	Comprehensive intelligence collection approach is valuable for broad strategic decisions only. A project-based intelligence acquisition is tailored to a specific project, which increases its potential for usable intelligence
15	Abramson *et al.* (2005)	Business management	Academia	Experiments with MBA's.	B-III–C-II	Access to actionable intelligence disseminated affects primarily prices and profits
16	Fleischer (2008)	Business marketing	–	Literature-based	B-I–B-I	Open sources provide important data but challenges analysts with indexing, internet volatility, languages, sources, volume, Web 2.0 developments
17	McCrohan (1998)	Business marketing	–	–	B-I–C-IV	The integration of intelligence collected and security, deception and psychological operations, permit firms to create an operation gap called commercial information operations (IO) between the firm and its competitor

(*continued*)

No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
18	Wright *et al.* (2009)	Business marketing	UK banks	Interviews with 23 executives	B-I–B-I B-I–C-I	UK banks describe intelligence collection as the understanding of the competitive environment and differed in their gathering and the evaluation of intelligence collection
19	Vedder *et al.* (1999)	Information systems computing	petrochemical transportation, retail, insurance	Survey	B-I–B-I B-I–C-I B-I–C-III	No formal intelligence collection unit in the majority of companies. Intelligence collection was valued most by executives reporting activity. Most believed intelligence to support decision-making. CEOs reporting intelligence activity claimed its usefulness in developing and implementing strategies
20	Cheng *et al.* (2009)	Information management Management	Cement and electronics	Archival data	B-II–B-II	The integration of decision support and knowledge management for business intelligence generation
21	Popovic *et al.* (2012)	Decision support Business	Slovenia. various industries	Survey	A-II–B-II B-II–C-IV C-IV–C-III	The greater the BI system maturity, the more positive the impact on information content quality. The greater the BI System maturity, the more positive the impact on information access quality
22	Dishman and Calof (2008)	Management marketing	Canada. Tech-related industries	Survey	B-I–B-I	Disparity between intelligence needs and the one reported. Collection involved Internal and external sources
23	Heinrichs and Lim (2003)	Information science Business decision support	Academia	Survey	B-II–C-III	The web-based data mining provides speed of insight generation, the business models assist the knowledge worker with the structure and focus for sense making
24	Haeckel (2004)	Management	–	–	B-I–B-I	Sensing the periphery involves: knowing earlier, managing by wire, dispatching capabilities from the event back
25	Holsapple *et al.* (2014)	Business Decision support	–	Published views of scholars	A-II–B-III B-III–B-III B-III–C-II	Two paths for firms for BI analytics: specialized (firms use BI at the BU level to improve operations) or collaborative (firms use BA broadly to bring the whole organization at the same level of BI sophistication). BI analytics as a decisional paradigm depends on the firm awareness and commitment, and its analytics culture

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No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
26	Peyrot *et al.* (2002)	Business	Maryland and Pennsylvania Industrial wholesalers	Survey	A-I–C-IV A-II–C-IV A-III–C-IV B-I–C-II	The perceived competitiveness of the environment was positively related to intelligence use. A curvilinear relationship between organizational size and intelligence use. Managerial perceptions of intelligence is positively associated with greater intelligence use. Greater effort devoted to obtaining intelligence is associated with greater intelligence use. Intelligence was used mainly for tactical ends
27	Sawyerr (1993)	Management Strategy	Nigerian SME manufacturing	Questionnaires to 47 executives	A-I–B-I	The perceived environment uncertainty (PEU) of the task environment is greater than the PEU of the remote environment. The higher PEU, the higher the level of interest in both the remote and task environment sectors. The PEU for both sectors was not a predictor of the frequency of use of internal and personal sources of information
28	Mariadoss *et al.* (2014)	Management Marketing International business	US-based medical devices company	Online survey	A-III–CII B-I–C-II	Salesperson product knowledge has a positive impact on salesperson B-IVgence behaviors. The effect of salesperson product knowledge on salesperson performance is mediated by SCIB, such that the indirect relationship between product knowledge and performance is positive
29	Taylor (1992)	Business	Fortune 1,000 and 500	Mail survey	B-I–B-I	Increased recognition of intelligence importance and lack of know-how of US intelligence users compared to European and Japanese ones
30	Michaeli and Simon (2008)	Marketing Mathematics	Tyrell, Inc vs Alpha, Inc	Case study	B-I–B-I	The use of Bayes' theorem to calculate conditional probability, determines when more information collection is needed and evaluate the validity of warnings
31	Chung *et al.* (2005)	Information systems Computing	Major search engines	Meta Search	B-II–B-II	BI explorer (BIE) diminishes information overload through its genetic algorithm to cluster websites and its multidimensional scaling algorithm for graphical display of websites

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Table 2.

No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
32	Lenz and Engledow (1986b)	Management Strategy	–	–	B-I–B-I	A better assessment of the environment would involve the use of a broader set of models appropriate for the environment layer. For general environment (industrial and organizational). For task environment (ecological and era model)
33	Fleischer *et al.* (2008)	Business Marketing	EAG medium-sized, not-for-profit association	Longitudinal case study	B-I–C-I	The integration of intelligence collection with CRM, DM, MR and the use of a cross-functional team enabled a not-for profit firm to improve its marketing strategies
34	Hughes *et al.* (2013)	Marketing	B2B logistics	customer and salesperson survey	A-III–B-I B-I–C-II	The greater the salesperson's customer orientation, the greater the amount of intelligence shared by the customer with the salesperson. The greater the information use, the greater the customer perceived value, the greater the share-of-wallet (quantity of sales)
35	Li *et al.* (2008)	Information management	Taiwan, a major ISP	Questionnaire	B-II–C-II	Decision support with BI technologies help companies identify the degree of usage, time of usage and day of usage of all customers' clusters
36	Zheng *et al.* (2012)	Business Management	online retail	Academic data	B-I–B-I	LIND model, which uses site centric data performed and the full NBD/Dirichlet model for inferring key competitive measures, with far less data
37	Elofson and Konsynski (1991)	Information systems Computing	Poland	Archival case study	B-I–B-I	The knowledge cash approach guarantees the continuity of the distributed problem-solving process, in the absence of the area specialist
38	March and Hevner (2007)	Decision support Business	–	–	B-II–B-II	The challenges of data warehouses are: the nature of data (structure vs unstructured), data quality and ad hoc queries
39	Chau *et al.* (2007)	Information management Management	Diversified firms	Evaluation study	B-II–B-II	Redips is effective and precise in extracting in backlink search, content analysis, results visualization

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No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
40	Tanev and Bailetti (2008)	Information systems Computing	Quebec small firms	Questionnaire	B-I–C-II	A clear relationship between the collected intelligence firms used and their innovation performance
41	El sawy (1985)	Management Strategy	Silicon Valley SME High Tech	Interviews with 37 CEOs	A-III–B-I	CEOs scan systematically, their information sources (personal and external). CEOs do not delegate their scanning. Their information system is very personal and decoupled from the organizational information system
42	Gilad *et al.* (1993)	Business Management	Diversified firms	Case studies	B-I–B-I	The evaluation of intelligence collection identifies competitive blind spots
43	Qiu (2008)	Marketing	SCIPs and the American Marketing Association	Online survey	A-III–B-I A-II–B-I	Managers' entrepreneurial attitude orientation has a positive relationship with their frequency and scope of intelligence scanning. Market orientation has a positive relationship with the scope and frequency of managerial scanning for competitive intelligence
44	Chaudhuri *et al.* (2011)	Information systems Computing	–	–	B-II–B-II	Data warehouse is challenged with the storing and extraction of unstructured data. The OLAP is challenged by multidimensional reporting. The RDBMS is challenged with the increase amount of data. ETL techs are challenged with real time decision-making
45	Ahearne *et al.* (2013)	Marketing	Fortune 500 media firm	Interviews	A-II–C-IV A-III–C-IV C-IV–C-II	A positive relationship between salesperson intelligence quality and salesperson performance. A positive relationship between district intelligence quality and salesperson performance. District managers' peer-network centrality buffers the negative cross-level moderating effect of district intelligence quality diversity
46	Gordon and Loeb (2001)	Information management	–	–	B-I–C-IV	Intelligence collection defense plan has two parts, the intelligence database with highly confidential information, and another destined for public

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Table 2.

No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
47	Maltz and Kohli (1996)	Marketing	High Tech	Survey	A-I–B-I A-II–B-I A-III–B-I B-I–C-IV	The greater the organizational commitment of a receiver, the greater the dissemination frequency. The greater the inter-functional distance, the lower the dissemination frequency and the greater the dissemination formality. The greater the market dynamism, the greater the dissemination frequency. The greater the dissemination formality the greater the intelligence use by a receiver
48	Lasserre (1993)	Management Strategy	Asia pacific	Survey	B-I–B-I	The task of information gathering is performed at two levels: regional where special unit collects information related to the economic and political climate/ national: subsidiaries where marketing/ product managers collect data
49	Chen *et al.* (2012)	Management Information systems	–	Bibliometric study	B-II–B-II	BI 1.0 and BI 2.0 provided organizations with insights from structured and unstructured data. While these maturing technologies have their challenges, new ones also prevail with the emerging of BI 3.0
50	Lau *et al.* (2012)	Information systems Computing	China, Forbes 2000 list	Evaluation experiments	B-II–C-III	The prototype BI 2.0 system for Web 2.0 intelligence proved helpful in assisting decision-makers with adaptive recommendations related to changing business context of mergers and acquisitions
51	Cheung and Li (2012)	Knowledge management Information systems	Angus Electronics	Case study	B-II–C-II	The BI prototype built in house, for sales associations discovery outperformed the commercial BI system WEKA. It provided benefits for both the operational and management level
52	Yasai-Ardekani and Nystrom (1996)	Business Management	North American firms listed in the planning forum membership directory	Questionnaires	A-I–B-I A-II–B-I	General environment changes may be less salient than task environment changes. Size does not differentially affect scanning frequency for organizations with effective systems vs those with ineffective systems. Organizations with effective scanning systems, operating in inflexible technologies, use a wider scope of scanning

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Table 2.

No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
53	Moro *et al.* (2015)	Business Information systems	–	Literature review	B-II–C-III	BI in banking is used mainly for risk prediction to better support decision-making
54	Chen *et al.* (2002)	Information science Decision support	–	Experiment comparison	B-I–B-I	Intelligence spiders diminishes information overload by indexing and analyzing the documents collected from websites that match the interest of the user. Intelligence spiders outperformed Lycos and within-site browsing, in precision, recall and ease of use
55	Lim *et al.* (1996)	Business Marketing	Ohio Diversified industries	Survey	B-I–C-I	Competitive environmental scanning is an important factor for determining a firm's position at various stages of the internationalization process
56	Peyrot *et al.* (1996)	Business Marketing	USA Industrial Wholesalers	Survey	B-I–B-I	Field employees were the primary sources of information about customers, suppliers and competitors
57	Kohavi *et al.* (2002)	Information systems Computing	–	–	B-II–B-II	The business value is the driving force for ongoing improvement of technologies challenges. BI technologies must reduce cycle time from data collection, analyzes, to impartment
58	Lenz and Engledow (1986a)	Management Strategy	USA, Canada Diversified industries	Interviews	B-I–C-II	It is still time for experimentation before the viability of specialized scanning units for introducing environmental information into strategic decision processes can be confirmed
59	May *et al.* (2000)	Management	Russia	Surveys with 96 executives	A-I–B-I	A mixed pattern of task and general environment sector effects. Russian executives PEU is related to unfamiliar sectors. Source accessibility and sector importance influence the frequency of the scanning of both internal and external sources
60	Wei and Lee (2004)	Information science Decision support	–	Empirical evaluation	B-I–B-I	The NEED technique performs event detection based on event properties extracted from news stories rather than features appearing in news stories, which hinders events categorization

(*continued*)

No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
61	Jennings and Lumpkin (1992)	Management	The Texas savings and loan (S&L)	Questionnaires and phone interviews	C-I–B-I	Organizations with a differentiation strategy tend to scan for opportunities for growth and customer needs, and organizations with a cost leadership strategy tend to scan for threats and monitor competitors and regulators
62	Leidner *et al.* (1999)	Management Information systems	Sweden/Mexico Diversified industries	Survey	A-I–B-III B-III–C-III B-III–C-IV	When fulfilled BI is used by CEOs to reinforce the decision-making behaviors valued in their culture. Swedish managers reported enhanced mental models from frequent and long-term use of BI
63	Xu *et al.* (2011)	Information science Decision support	–	Evaluation experiment	B-I–B-I	The two-level CRF provided better extraction of comparative relations by using the complicated dependencies between relations, entities and words, and the unfixed interdependencies among relations
64	Pawar and Sharda (1997)	Information management Management	–	–	B-I–B-I	A generic guiding framework for online information retrieval: signals are collected through undirected and conditioned viewing and facts are gathered via informal and formal search
65	Christen *et al.* (2009)	Management Marketing	–	–	A-III–B-I A-II–B-I	It is the limited managerial capacity to analyze data and integrate insights into a decision that leads to imperfect information. The trade-off between a focused and a broad intelligence collection strategy depends to a large extent on the firm's data processing capacity
66	Sheng *et al.* (2005)	Information systems Computing	–	–	B-I–C-IV	The firm gathered intelligence defensive use would be oriented toward a routine analysis of the system logs activities, elimination of unnecessary conveniences on the firm's URls, shrink the online information lifetime, make competitors' IAs work longer; Put false information in a firm's own databases; Publish more soft and less hard data; Backup data more frequently

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No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
67	Brownlie (1994)	Marketing	–	–	B-I–B-I	Environmental scanning should have a broader role where it actively participates in the environment, rather than merely collect data about it in a passive fashion
68	Ebrahimi (2000)	Management	Hong Kong. service/ manufacturing	A survey to 55 executives	A-I–B-I	The PSU of the task environment is greater than the remote environment. Executives are pragmatic and focus on the factors important to daily operations
69	Lin *et al.* (2009)	Industrial engineering Management	–	Case study	B-II–B-II	Meeting enterprises requirements' (MER) is the most concerned criteria that senior experts evaluate in the BI system, followed by 'meeting user's needs' (MUN)
70	Cho (2006)	Management International Business	30 airline companies	Archival sources	A-III–B-I	After the environmental shift the majority of TMT widened their focus and heightened the depth of environmental scanning. The more the TMT experienced turnover, the more the changes in its environmental scanning. The heterogeneity has a moderating role on TMT turnover and scanning. The output orientation had a positive effect on environmental scanning frequency and scope
71	Elenkov (1997)	Management Strategy	Bulgaria/single business manufacturing/sales	141 interviews with executives	A-I–B-I	The strength of the relationship between perceptions of strategic uncertainty and environmental scanning behaviors depends on the combined effect of the environmental constraints and decision-making approach
72	Fabbe-Costes *et al.* (2014)	Operations Management Management	France	Interviews and focus group	B-I–B-I	Scanning activities encompassed the societal level, the firm level, the functional level, the people level. No scanning involved consumers
73	Le Bon and Merunka (2006)	Management Marketing	Consumer goods, industrial and services	Questionnaires	A-II–B-I A-III–B-I	Desire for upward mobility, the effective role of recognition and motivation positively influence salespeople's willingness to share marketing intelligence from the field

(*continued*)

No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
74	Viaene and Bunder (2011)	Management	Diversified industries	Interviews and questionnaire	B-II–B-II	BI project managers tackle their assigned projects in a sequential order encompassing room for change and trial and error, continuous learning and partnerships
75	Sharma *et al.* (2014)	Business Information systems	–	Literature review	B-II–C-II	The path from the use of business analytics to organizational performance is complex. It involves three phases, namely, data to insight, insight to decision and decision to value
76	Srivastava and Coole, (2003)	Computer science Engineering	–	Case study	B-II–B-II	The mining of the web for actionable knowledge involves BI technologies for web-based content acquisition (information retrieval and information extraction) and knowledge creation (discovered knowledge filtering and the retaining of the actionable one)
77	Brown (2004)	Computer science Management	–	–	B-I–B-I	Organizations should be ambidextrous in intelligence collection, capable of building two cultures, namely, one for sensing the periphery and one core business-oriented
78	Walters *et al.* (2003)	Management Marketing Information systems	USA Manufacturing	Questionnaires	A-I–B-I	Operational efficiency (internal environment) and market (external environment) were crucial for all executives in the study. Intelligence collection should provide a comprehensive view of the internal and external environment, not only focus on the external environment
79	Leidner and Elam (1993)	Information systems Business	USA Diversified industries	Survey	B-III–C-III	The more frequent and longer BI support use, the faster the problem identification speed, the decision-making speed and the extent of analysis
80	Volonino *et al.* (1995)	Information systems Management	–	–	B-III–B-III	BI support improves information flow down to subordinates and up to executives. BI support be implemented for all business users, with a customized interface and system capabilities to support the executives' specific needs

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Table 2.

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No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
81	Ahituv *et al.* (1998)	Information systems Management	Israel Diversified industries	Interviews with 40 CEOs	C-II–B-I	Firms succeeding better with new products will show a greater correlation between strategic uncertainty and frequency of scanning of the technological, economic and socio-cultural sectors. Successful firms will exhibit more frequent formal scanning in the task environment than do less successful films
82	Belcher and Watson (1993)	Information systems Management	USA Conoco	Statistical analysis and interviews	B-III–B-III B-III–C-II B-III–C-III	There is no single way to evaluate BI support system. BI support improved productivity, and its benefits were found to exceed the system's costs
83	Watson *et al.* (1991)	Information systems Management	USA Diversified industries	Questionnaire	B-III–B-III	BI support is executive-oriented, developed with a minor cost benefit analysis in an iterative process
84	Jones and Mcleod (1986)	Business Decision support	USA Diversified industries	Interview and questionnaire	A-III–B-I	When engaged in improvement projects, the executives preferred inputs from internal sources and verbal messages. When allocating resources, the executives preferred to use internal information regardless of the form
85	Elbashir *et al.* (2011)	Business Accounting	Australia 612 clients of BI software vendor	Survey	A-II–B-III A-III–B-III	The increased levels of operational-level absorptive capacity enhance the levels of BI assimilation. The increased levels of TMT absorptive capacity enhance the operational-level absorptive capacity. The increased levels of TMT's absorptive capacity enhance the organizations' BI assimilation
86	Slater and Narver (2000)	Business Marketing	Electronics	Questionnaires/ literature review/ interviews	B-I–C-II	The market focused intelligence generation is positively related to superior sales growth. Intelligence Generated from repetitive experience was positively related to customer satisfaction. Intelligence generated through collaboration was positively related to superior quality. Intelligence generated through experimentation was positively related to new product development success

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No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
87	Boyd and Fulk (1996)	Management	USA: diversified industries	Survey	A-I–B-I	Strategic importance was the primary determinant of scanning. Scanning declined as the environment was perceived to be more complex. Perceived variability interacted with importance to positively affect scanning
88	Leidner and Elam (1995)	Information systems Business	USA: companies developing EIS	Survey 26 phone interviews six on-site interviews	B-III–C-III B-III–C-IV	The more frequent and the longer the manager's use of BI support, the faster the speed of problem identification, the greater the enhancement to his/her mental model the greater the extent of analysis and the speed of the decision-making process. The more frequent the manager's use of BI support, the greater the perceived information availability
89	Akter *et al.* (2016)	Management Business Operations management	US: business analytics	Two Delphi studies with 61 analytics practitioners, consultants and academics	B-III–C-II	The BI analytics capability model enhances firm performance. Analytics capability–business strategy alignment has a significant moderating impact on the BI analytics–firm performance
90	Arnott *et al.* (2017)	Information technology Business	Australia: Government, Insurance China: Insurance and online retailer	Secondary case analysis of 8 BI systems 142 Semi-structured interviewed across 4 company cases	B-III–C-II	Enterprise BI systems are effective support for Type 2 decisions (operational and management control)
91	Audzeyeva and Hudson (2016)	Information systems Business	UK: retail bank	Semi-structured interviews	B-III–C-I A-II–B-III	An organization's ability to extract strategic BI benefits is influenced by its deep structure (core beliefs, organizational structures, control systems and distribution of power)
92	Aversa *et al.* (2018)	Information systems Business	UAE: formula 1	Semi-structured interviews 52 media documents	A-III–B-III B-III–C-I	Three interrelated sources of strategic failure for decision-makers using BI support, namely, the situated nature and affordances of decision-making; the distributed nature of cognition in decision-making; and the performativity of the BI support

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No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
93	Bordeleau *et al.* (2020)	Information systems Operations management	Canada: Telecommunications, Electronic components	Multiple case study Interviews four cases	A-II–B-III B-III–C-II	Enterprises resources and BI capabilities are not sufficient to predict business value. They need to be combined with organizational learning and ambidextrous organizational culture
94	Brichni *et al.* (2017)	Software engineering Design science	France: STMicroelectronics	Interview/ questionnaire BI/Business experts and users	B-III–B-III	BI4BI system is based on BI systems' data and BI users' feedbacks. This system provides better BI evaluation criteria, level of automation and continuous processing by relying on two complementary solutions (a system-based solution and a user-based solution)
95	Chen *et al.* (2015)	Information systems Operations management	US: product-centric firms	Survey of 161 managers	B-III–C-I A-I–B-III	Organizational-level BI analytics usage affects organizational value creation. Environmental dynamism moderates the BDA usage influence on value creation. Technological factors directly influence organizational BDA usage while organizational and environmental factors indirectly influence it
96	Constantiou *et al.* (2019)	Decision support Information systems	Northern Europe: large bank	43 semi-structured interviews IT and business units	B-III–C-III A-III–B-III	Decision-makers use four techniques to communicate and share intuitive judgments during organizational decision-making that build on the BI output. Senior managers are prone to use intuitive judgments when these are at odds with quantitative information from the BI system
97	Côrte-Real *et al.* (2017)	Business Strategy	Europe: 500 firms Dun and Bradstreet database	Survey, 175 IT/ business executives	B-III–C-IV	BI analytics applications can allow an effective internal and external knowledge management, which can help firms to create organizational agility. BI analytics can support organizational knowledge management, allowing the creation/ enhancement of dynamic capabilities

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No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
98	Côrte-Real *et al.* (2019)	Business Strategy	Europe: Industry, Academic, Consultant software vendor	Delphi study, semi-structured interviews, 22 participants, 175 respondents	A-I–B-III A-II–B-III B-III–C-I	Dynamic capabilities and strategic business/IT alignment positively contribute to the BI analytics value. The strategic role of BI analytics has no significant influence on the BI analytics sustained value. Environmental volatility negatively influences BI analytics value creation
99	Côrte-Real *et al.* (2020)	Business Strategy	US and Europe: manufacturing, retail trade	Survey of 618 firms	B-III–C-II	BI analytics can create significant value in business processes if supported by a good level of data quality
100	Fink *et al.* (2017)	Industrial engineering Management	Israel: manufacturing, services	Interviews three cases	B-III–C-II B-III–C-IV	Business value is generated from BI assets via two parallel mechanisms, operational and strategic. Organizations may become ambidextrous in their BI capabilities in the same way they can become ambidextrous in their approach to organizational learning
101	Ghasemaghaei and Calic (2020)	Business	US: services, utilities, financial	Survey of 239 managers	B-III–C-II	Data variety and velocity positively enhance firm innovation performance, and finds no impact of data volume on firm performance
102	Grover *et al.* (2018)	Information systems Management	Ebay, CancerLinQ, Walmart, DeutscheBank, UPS	Application to use cases	A-II–B-III B-III–C-II	Increasing BI analytics infrastructure investments in the quality and quantity of data and analytical skills enhances BI capabilities, which, in turn, enables organizations to determine value targets mediated by value creation mechanisms. Contextual factors moderates the relationships between BI capabilities, value targets and mechanisms
103	Gupta and George (2016)	Information systems Operations management	Computers, financial services, internet, communications	Survey of 232 big data Analytics managers and 108 CIOs	B-III–C-II	BI analytics capability that is measured and tested to showcase a linkage to superior firm performance

(*continued*)

Table 2.

Table 2.

No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
104	Hallin *et al.* (2017)	Industrial economics Management Decision support	Scandinavia: hotels	Survey of 626 front-line personnel 3 cases	A-III–B-I B-I–C-III	An index formed through the systematic collection of frontline sensing evaluates firm capabilities and their adaptation to environmental change and offers reliable predictive information for strategic decisions
105	Kumar *et al.* (2020)	Operations management Business	US: Multimedia industry	1 case (internal firm data, commercial market data and secondary data)	B-I–B-I B-I–C-II	An intelligence collection system for firms to generate competitive intelligence over time from restricted data and finds that timely recovery of disaggregated information at product-firm-market level assists the firm in superior resource allocation
106	Lin and Kunnathur (2019)	Manufacturing management Information management	Manufacturing, operations, IT industry	Survey of 251 managers	A-II–B-III	Three strategic orientations (customer, entrepreneurial, technology) and one aspect of organizational culture (developmental) are important contributors to the development of BI capability
107	Merendino *et al.* (2018)	Marketing Business Strategy	UK: manufacturing, services	Semi-structured interviews with 20 directors	B-III–C-III	BI disrupts the process of board level decision-making across three areas (cognitive capabilities, board cohesion, responsibility/control within senior teams)
108	Mikalef *et al.* (2019)	Information systems Management Computer science	Greece: Bank and Financials, consumer Goods . . .	Survey data from 175 CIOs and IT managers	A-I–B-III B-III–C-II B-III–C-I	BI analytics capability enables firms to generate insight that can help strengthen their dynamic capabilities, which, in turn, positively impact incremental and radical innovation capabilities. In high environmental heterogeneity, the impact of BI analytics capability on dynamic capabilities and, in sequence, incremental innovation capability is enhanced
109	Popovič *et al.* (2018)	Information systems Management	Construction, pharmaceuticals, home appliances	Multi-case design, 3 cases semi-structured interviews	B-III–C-II B-III–C-III	BI analytics capability along with organizational readiness and design factors facilitate better utilization of BI analytics in manufacturing decision-making, and thus, enhance high value business performance

(*continued*)

Table 2.

No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
110	Pryor *et al.* (2019)	Management Strategy	US: financial services, agriculture, energy production, health care, property management, software development, transportation	Surveys of 358 executives, 17 firms	A-III–B-I B-I–C-II	Top executives' goal orientations affect their firms' environmental scanning. Top executives who exhibit higher learning goal orientations or higher performance prove goal orientations might engage in more environmental scanning than top executives who avoid goal orientations. Firm environmental scanning is positively related to firm performance
111	Robinson and Simmons (2017)	Management Strategy	Global: oil and gas, offshore services, financial services, defense	7 cases Semi-structured interviews corporate or business unit strategy	B-I–B-I A-II–B-I	The quality of the information source is less important in explaining information source use. Organizations rely on internal reporting on the environment, compiled using multiple channels
112	Seddon *et al.* (2017)	Information systems Computing	BA vendors	Assessment method 100 customer success stories	B-III–C-II	A two parts success model of BI analytics to create business value (a process and a variance model)
113	Urbinati *et al.* (2019)	Industrial engineering Management	Italy: big data industry	Multi-case study analysis: nine cases	A-II–B-III B-III–C-I	Provider companies create and capture value from BI by two main BI innovation service strategies (use case-driven, process-driven), which differ from each other because of three reasons (the management of data, the use of the technology, the characteristics of the analytic solution)
114	Vidgen *et al.* (2017)	Information systems Business	UK: mobile telecoms, broadcasting transportion	Mixed methods approach (Delphi study/interviews) 3 cases	B-III–B-III B-III–C-II	31 key challenges in building BI analytics capabilities and 21 corresponding recommendations to create BI into business value
115	Wamba *et al.* (2017)	Business Information technology	China: IT and analytics	Online survey to 297 IT managers and analytics specialists	A-III–B-III B-III–C-II	The value of the entanglement conceptualization of the hierarchical BI analytics capability model, and the mediating role of dynamics capabilities process on enhancing firm performance

(*continued*)

Table 2.

No.	Author(s)	Discipline	Industry firm characteristic region	Sample size method	Linkage(s)	Key findings
116	Wang *et al.* (2018)	Information management Management	US, Canada, Australia, China, India, the Netherlands: Health care	Analysis of 33 cases descriptions	A-III–B-III B-III–B-III B-III–C-II	BI analytics capabilities are linked to IT-enabled transformation practices and to benefits and business values. Four BI analytics capabilities (analytical capability, decision support capability, traceability and predictive capability) and three path-to-value chains (from analytical capability to IT infrastructure benefits, from decision support capability to operational benefits, from traceability to IT infrastructure benefits)
117	Reinmoeller and Ansari (2016)	Management Strategy	US: 41 industries	Archival data, semi-structured interviews	A-II–B-I B-I–B-I	Three factors contribute to the persistence of the use of intelligence collection practice (keeping it opaque to avoid the negative effects of stigmatization, constructing' usefulness to justify its ongoing use by leveraging accepted beliefs and invoking fear of unilateral abandonment and adapting it by developing multiple versions to increase its zone of acceptability)
118	Shollo and Galliers (2015)	Operations management Information management	Scandinavia: Finance	Illustrative case study 16 interviews	B-III–C-IV	BI systems trigger a performative outcome in relation to organizational knowing through two practices (the ability to initiate problem articulation and dialogue and data selection)
119	Opait *et al.* (2016)	Management Strategy	Romania: IT solutions	1 case, statistical analysis of CI budgeting	A-I–B-I B-I–B-I	Changes in strategic priorities through financial reconfiguration following environment instability. Intelligence collection budgeting in a period of instability favors reinforcing the vigilant learner position
120	Kowalczyk and Buxmann (2015)	Information systems Management Decision support	Telecom, media, finance, logistics	Multiple case study (11 cases) Semi-structured interviews	A-II–B-III B-III–B-III B-III–C-IV	Tensions that arise from the conflicting task requirements and that pose a challenge for effective BI analytics support and provide insights into tactics for managing these tensions and achieving ambidexterity

(1) *Antecedents*. Similar to biological organisms, firms' actions are often constrained by their external environments (Brownlie, 1994). This implies that organizations should constantly monitor their respective environments to ensure the detection of plausible alterations susceptible of jeopardizing their competitive advantage. Their BI processes are, hence, influenced by *environmental factors* (A-I) such as uncertainty (Hubert and Daft, 1987), complexity (Child, 1972), rate of change (Daft *et al.*, 1988), importance (Aaker, 1983; Pfeffer and Salancik, 1978), culture (Leidner *et al.*, 1999) and competitive pressures (Zhu and Kraemer, 2005). Further influence on the BI process can be attributed to the *organizational context* (A-II). This may include organizational factors such as size (Yasai-Ardekani and Nystrom, 1996), institutional isomorphism (DiMaggio and Powell, 1983), core technologies (Thompson, 1967), structural flux (Maltz and Kohli, 1996), market orientation (Narver and Slater, 1990) and IT sophistication (Armstrong and Sambamurthy, 1999). Finally, *managerial and individual attitudes* (A-III) affects the BI process through managerial heterogeneity (Cho, 2006), experience (Thomas *et al.*, 1991), managerial attitude (Qiu, 2008; Pryor *et al.*, 2019), absorptive capacity (Elbashir *et al.*, 2011) and decision roles (Mintzberg, 1973).

(2) *BI process.* While alterations in the aforementioned antecedents are believed to impact the BI process, characteristics of this latter are also crucial for understanding the different patterns of the BI process literature. At the outset, *the intelligence collection phase* (B-I) is pictured as the first link between a firm and its environment, whereby it can comprehend the happenings and remain vigilant to changes (Hambrick, 1981; Lönnqvist and Pirttimäki, 2006; Turban *et al.*, 2010). Traditionally, the collection phase was fed through open and human sources. However, with the advent of the internet, it faced the challenge of information overload (Chen *et al.*, 2002). The abundance of data created a lack of executives' attention, and called for a more tailored *intelligence transformation phase* (B-II) to support managerial action (Fabbe-Costes *et al.*, 2014; Christen *et al.*, 2009). In response, the BI analysts used computerized decision support systems to prepare the requested intelligence for executives (Leidner and Elam, 1993). Such decision aids stimulated, eventually, the design of the executive information system with the purpose of retrieving the information related to internal operations and the business environment (Turban and Schaeffer, 1987; Turban *et al.*, 2010). A further scrutiny of the *transformation phase* (B-II) reveals that both structured and unstructured data are extracted from operational and external sources, then prepared and loaded into the data warehouse, for a later clustering into Data Marts. This process is usually performed through the extract-transform-load (ETL) application. On the one hand, the data warehouse usually deploys a relational database management system (RDBMS) to store data and rapidly execute queries across a wide range of data. On the other hand, the data warehouse is corroborated by an online analytic processing (OLAP) server in charge of filtering, and drawing thorough analysis (slicing and dicing, drill down. . .) of the data, which, in turn, is communicated to the user interface (dashboards, spreadsheets. . .) that yields the way to the *Usage phase* (B-III) (Chaudhuri *et al.*, 2011; Sen and Sinha, 2005; Singh *et al.*, 2002). This last phase of the BI process offers the required capability to conduct predictive analysis, streamline intelligence content and ensure an effective practice of the BI process and its alignment across organizational culture, analytical capabilities and the human capital propensity for BI (Holsapple *et al.*, 2014; Viaene and Bunder, 2011; Chaudhuri *et al.*, 2011; Sen and Sinha, 2005; Singh *et al.*, 2002).

(3) *Outcomes*. The BI process was found related to certain outcomes (C): of a *strategic order* (C-I) such as strategic management process (Hofer, 1978) and managerial representations of competitive advantage (Porac and Thomas, 1990); *at a firm performance level* (C-II) such as share of wallet (Zeithaml, 1988), customer perceived value (Hughes *et al.*, 2013), product development (Lynn, 1998) and superior sales growth (Slater and Narver, 2000); *related to decision-making* (C-III) including decision-making speed (Leidner and Elam, 1995), problem identification speed (Leidner and Elam, 1995) and extent of analysis (Miller and Friesen, 1980); and *under the umbrella of organizational intelligence* (C-IV) encompassing perceived intelligence quality (Popovič *et al.*, 2012), perceived information availability (Leidner and Elam, 1995), intelligence use (Maltz and Kohli, 1996), receiver's trust (Moorman *et al.*, 1992) and insight generation speed (Heinrichs and Lim, 2003).

After plotting the linkages of each study in Table 2, we sought to allow for a visual display of the linkages explored, and the ones overlooked, therefore we juxtaposed the elements of the BI process (BI-II-III), antecedents (AI-II-III) and outcomes (CI-II-III) in a review matrix, exhibited in Figure 1, where rows represent the independent variables, and columns represent the dependent variables, and each coded study (01–120) is allocated into its appropriate linkage cell. Finally, we synthesized and depicted the aforementioned interrelationships in the form of an integrative framework we present in Figure 2. The framework displays three clusters of antecedents (A), namely, environmental factors (A-I), organizational factors (A-II) and managerial and individual attitudes (A-III); three characteristics of the BI process (B), namely, collection (B-I), transformation (B-II), usage (B-III); and four sets of outcomes (C), namely, strategic (C-I), firm performance (C-II), decision-making (C-III) and organizational intelligence (C-IV).

	B-I	B-II	B-III	C-I	C-II	C-III	C-IV
A-I	87,27,07,52, 71,59,68,08, 47,119, 78	04,	62, 95,108, 98				26,47
A-II	08,52,111, 43, 47,65,117	04,85,21,	25, 91, 95, 98, 102,106, 120, 113, 93,				45,26,47
A-III	41,08,70,110, 84 34,43,73,65, 104,	85,	92, 96, 116, 115,				45,26,47, 21
B-I	37,72,77,32,67,24, 64, 60,08,111,09, 63,30,36, 19, 48, 16,14,10,18,22,02, 01,54,12,29, 56, 42,86,105,117,119			55, 33,19, 18	110, 86,28, 10, 18,26,19, 40, 34,06, 105	58, 03,10,19, 104	66,17, 47 46
B-II		20,49,39,31,76,57,38, 44, 74,13, 11, 69,		35	51,75,	50,53,23,	21,51,
B-III			25,83,80,82,94,114 , 116, 120	05,82, 91, 95, 108, 113,92, 98	15,82, 89, 90, 99, 100, 101, 102, 103, 109, 112, 114, 116, 115, 25, 93, 108	62,79, 82, 96, 88,107, 109	62,88, 97,100, 120, 118,
C-I	61, 52						
C-II	07,81						
C-III							
C-IV					45		47

A-I: Environmental Factors
A-II: Organizational Factors
A-III: Managers/ Individual Factors
B-I: Collection
B-II: Transformation
B-III: Usage
C-I: Strategic Outcomes
C-II: Firm performance
C-III: Decision Making
C-IV: Organizational Intelligence

Figure 1.
Linkage-exploring review matrix

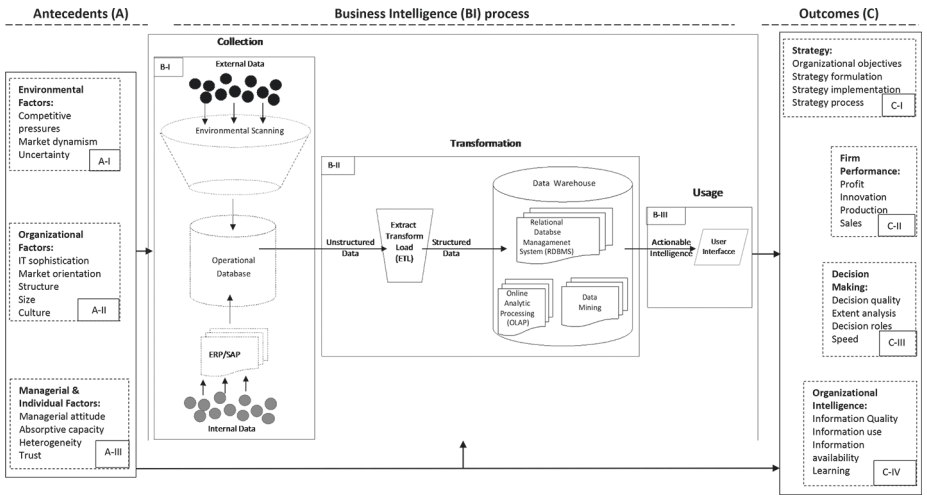

Figure 2.
BI process: an integrative framework

Research within the framework falls into four categories, namely, the first one explores the influence of the antecedents on the BI process (A-I-II-III – B-I-II-III); the second explores the BI phases separately, describing the state of affairs and prescribing optimal processes (B-I-II-III); the third set of studies examines the linkages between the BI process and its ensuing outcomes (B-I-II-III – C-I-II-III-IV); and the fourth set of studies examines the moderating role of antecedents on the relationship between the BI process and outcomes (A-I-II-III – B-I-II-III – C-I-II-III-IV).

Literature synthesis

Stream 1: the influence of antecedents on the BI process (links A-I-II-III – B-I-II-III)

The environmental influence on the BI process motivated multiple studies that shaped the first cluster of this stream, although the nature of this linkage is still equivocal. This is due to inconsistent views of environmental heterogeneity and uncertainty, and the partial accounts of the BI process. These treatments, rooted in management, bifurcate into two strands. First, a constellation of studies that focus on the frequency and scope of BI collection (Boyd and Fulk, 1996; Daft *et al.*, 1988; Ebrahimi, 2000; Elenkov, 1997; Maltz and Kohli, 1996; May *et al.*, 2000; Sawyerr, 1993). Their findings are at best exploratory and piecemeal as they adopt a "one rule fits all" approach to different environmental layers (e.g. political, customer, direct and remote) let alone country-level contexts (e.g. developed vs developing). By so doing, they overlook the peculiarities of developing economies where other informal pressures and singularities (cultural, institutional and cognitive) moderate the relationship between the environment and BI collection. The second thread of studies examine executives' goal orientations (Pryor *et al.*, 2019), strategic priorities (Opait *et al.*, 2016) quality of information source (El Sawy, 1985; Jones and McLeod, 1986; Robinson and Simmons, 2017), experience and educational background (Cho, 2006), entrepreneurial attitude (Qiu, 2008), intuitive judgments (Constantiou *et al.*, 2019) and boundary spanners' intelligence effort (Le Bon and Merunka, 2006; Mariadoss *et al.*, 2014), customer orientation (Hughes *et al.*, 2013). Unfortunately, these studies overlook to consider the collection activity as a formal unit within the organization, and explore the informal BI collection and source selection of boundary spanners and executives despite previous evidence of their bounded rationality (Cyert and March, 1963). Besides, we still know little about the

upper management's cognitive and managerial characteristics, which implicitly determine their BI collection, not to mention the need to verify, which leadership approach serves best this activity. Credit is given to Elbashir *et al.* (2011), being the only scholars of this stream who examined the influence of the absorptive capacity of managers on BI assimilation. Similar studies must follow this line to explore the influence of absorptive capacity on the entirety of the BI process. To this date, all we know, in this context, is the positive influence of the absorptive capacity of managers on organizations' BI assimilation (Elbashir *et al.*, 2011). Further, studies examining boundary spanners collecting and gathering of intelligence like their engagement to their desire for upward mobility and recognition. Therefore, boundary spanners' involvement in BI collection is a variable of managerial stimulation, and hence, more studies are needed to examine the moderating effect of management appraisal on the linkage between BI collection and boundary spanners' scope and frequency of BI collection.

The significant focus of management scholars on the environment and the managerial and individual factors as the primary antecedents of the BI process came at the expense of overlooking the organizational factors susceptible of influencing the BI process. Conversely, studies, rooted in marketing and decision support, shed light on the ability of the organizational context to alter the BI process, particularly the collection phase and its linkage to decentralized organizational culture (Babbar and Rai, 1993), size and core technologies (Yasai-Ardekani and Nystrom, 1996), inter-functional distance and structural flux (Maltz and Kohli, 1996), organizational market orientation (Qiu, 2008), resource scarcity (Christen *et al.*, 2009), institutional isomorphism (Ramakrishnan *et al.*, 2012), analytical culture (Holsapple *et al.*, 2014; Popovič *et al.*, 2012); IT infrastructure (Elbashir *et al.*, 2011), organizational culture (Leidner and Elam, 1995, 1999) and organizational beliefs (Reinmoeller and Ansari, 2016). Although harmonious in its uniformity, this line of research was limited to the BI collection phase except for two studies that extended their focus to BI support and its linkage to organizational orientation and culture (Lin and Kunnathur, 2019) and organizational tensions (Kowalczyk and Buxmann, 2015).

Stream 2: the business intelligence process (links B-I-II-III)

The review of the literature illustrates a shared conceptual meaning, across marketing and management scholars, regarding the nature of BI collection as an activity that seeks to proactively monitor a dynamic environment and that ends once data has been collected (Babbar and Rai, 1993; Bernhardt, 1994; Calof and Wright, 2008; Slater and Narver, 2000). Unfortunately, the literature within this stream was considerably explorative of the BI collection activities and practices (Taylor, 1992; Vedder *et al.*, 1999; Dishman and Calof, 2008; Wright *et al.*, 2009). While some marketing scholars emphasized the use of Bayes' theorem to determine when more collection becomes cost (Michaeli and Simon, 2008), other explored information sources companies use (Fleisher *et al.*, 2008; Lasserre, 1993; Peyrot *et al.*, 1996) or developed indices to evaluate the adaptability of firm capabilities to BI collection of boundary spanners (Hallin *et al.*, 2017) or to collect BI from disaggregated data (Kumar *et al.*, 2020). While a stream of scholars examined trust in BI collection quality (Robinson and Simmons, 2017), others investigated the type and source of the collected intelligence (Peyrot *et al.*, 1996) or the capabilities to decode each type of intelligence be it soft (Lasserre, 1993) or web-based (Fleisher, 2008; Pawar and Sharda, 1997). On the other hand, an apparent discussion within this stream involves the collection approach, i.e. the comprehensive vs the project-based model. A priori, the comprehensive mode seems a better fit to broad strategic decisions, while the ad-hoc approach is more project-oriented. The narrowed focus of the project-based approach is believed to generate more accurate intelligence compared to the holistic model (Prescott and Smith, 1987). Nonetheless, this

paradox shifts the debate to the culture and the core business of organizations. For some scholars, organizations might choose to participate in the environment rather than passively observing it (Brownlie, 1994). By so doing, the underpinning motive of such an activity swings from BI collection to sense giving (Gioia and Chittipeddi, 1991), from informing to influencing, from a mere passive to proactive BI collection (Brownlie, 1994). Other scholars suggest that ambidexterity arises as a reasonable option whereby the firm can develop two cultures, namely, one for sensing peripheral patterns; the other is core business-oriented (Brown, 2004; O'Reilley and Tushman, 2002; Ghosal and Westney, 1991; Gilad *et al.*, 1993).

Conversely, literature with scaffolding in information systems and decision support, fueled by the desire of bridging the gap between the business user and BI transformation and usage, criticized the firms' focus on collection over analysis despite the challenge of information overload and gave significant attention to testing in-house acquisition techniques of BI collection to curb the exorbitant price of third-party sources by proposing Limited Information NBD/Dirichlet (LIND) models to infer key competitive measures based on site-centric data (Zheng *et al.*, 2012) or two level conditional random fields (CRF) models to extract comparative relation features from entities and words (Xu *et al.*, 2011) or event detection (NEED) applications that perform events detection based on properties extracted from news stories (Wei and Lee, 2004) or proposed 80/20 rule-based models for reduction of cycle time (Kohavi *et al.*, 2002; Liu and Wang, 2008) or suggested data slicing and dicing technologies, which index and analyze documents collected from websites matching users' interest (Chen *et al.*, 2002) or grant rapid access displays of data (Walters *et al.*, 2003). One commonality within this research stream is the evaluation of the proposed tool against the commercial engines (Chen *et al.*, 2002; Zheng *et al.*, 2012; Xu *et al.*, 2011).

The coming of the WEB 2.0, digitization, the internet of things and Big Data further challenged the BI process by technical issues in regard to (a) the time consuming process of transforming and storing structured and unstructured data into the data warehouse, (b) the lack of techniques capable of, simultaneously, alleviating data heterogeneity and integrating slice, dice, roll-up and drill-down dimensions for data evaluation, (c) the multidimensional view of data through OLAP, which needs continuous performance improvement; (d) the rising volume of data, which challenges the capacity of the RDBMSs to query and store data, (e) the pressure on ETL to filter, cluster and integrate current operational data, for real time decision-making support and (d) detect hidden patterns in terabytes of data (Chaudhuri *et al.*, 2011). This ushered most empirical studies in this stream to shift their attention to what Chen *et al.* (2012) refer to as BI 3.0 or mobile BI and accordingly update BI technologies and develop new applications that can detect patterns in terabytes of data, diminish further information overload, and merge structured with unstructured data (Chen *et al.*, 2012; Srivastava and Cooley, 2003; Chung *et al.*, 2005; Chau *et al.*, 2007; Cheng *et al.*, 2009; Lin *et al.*, 2009) or decipher frameworks for evaluation BI process based on users' feedback (Brichni *et al.*, 2017) or modeling its best practice approach for less challenges (Vidgen *et al.*, 2017; Wang *et al.*, 2018a; 2018b). However, this might not be enough to ensure an effective usage of BI as this latter hinges on the alignment across organizational culture, analytical capabilities and the human capital propensity for BI (Holsapple *et al.*, 2014; Viaene and Bunder, 2011). No empirical studies have yet to investigate this triadic relationship and its moderating variables for better BI usage.

Stream 3: the influence of the business intelligence process on outcomes (links B-I-II-III – C-I-II-III-IV)

Drawing from marketing research, scholars explored the influence of BI collection and managerial representation of competitive advantage (Qiu, 2008), managerial belief in

formulating and implementing strategies (Vedder *et al.*, 1999) improvement of marketing strategies (Fleisher *et al.*, 2008). Other scholars suggested that BI collection translates to share of wallet and profit margin (Hughes *et al.*, 2013) and sales performance (Mariadoss *et al.*, 2014), product innovation and competitive pricing strategies (Trim and Lee, 2008), price optimization, expanding product lines and service improvements (Peyrot *et al.*, 1996), superior sales growth, customer satisfaction (Slater and Narver, 2000), innovation (Tanev and Bailetti, 2008) and profitability and revenues increase (Wright *et al.*, 2009). Although these studies might pinpoint to the relationship between BI collection and strategic outcomes, the question of whether or not this step of the BI process contributes to strategy formulation or implementation remains ambiguous.

Furthermore, the available evidence, drawing from management, demonstrates two stocks of research: one that indicates a clear relation between BI support and productivity enhancement, and information distribution cost savings (Belcher and Watson, 1993), price competition (Abramson *et al.*, 2005), firm performance (Akter *et al.*, 2016; Gupta and George, 2016), business value (Côrte-Real *et al.*, 2020; Seddon *et al.*, 2016; Wang *et al.*, 2018a; 2018b), innovation (Ghasemaghaei and Calic, 2020); another that suggests BI support adds value to the organizational intelligence in at least two interrelated ways, namely, workforce learning (Cheung and Li, 2012), information access quality (Popovič *et al.*, 2012), data security (Gordon and Loeb, 2001; McCrohan, 1998; Sheng *et al.*, 2005; Vedder *et al.*, 1999) and intelligence use (Maltz and Kohli, 1996) and organizational knowledge management (Côrte-Real *et al.*, 2017; Shollo and Galliers, 2015).

The research strand, rooted in information systems, was limited to providing benchmarks of their BI support technologies to which they ascribe a linkage to the decision-making process. Scholars presented their prototypes and evaluated their success for mergers and acquisitions (Lau *et al.*, 2012), and banking and financial decisions (Moro *et al.*, 2015). Besides, information systems scholars had a penchant for solving tactical issues because of their straightforward evaluation or to scholars' approach to BI, as a set of separate technologies rather than a holistic decisional paradigm. Therefore, their contributions integrate BI technologies such as data warehouse and data mining into BI support and address its ability to improve firm performance indicators. Studies examined and demonstrated the positive impact of BI support on crafting personalized customer strategies (Li *et al.*, 2008), decision-making (Aversa *et al.*, 2018), strengthen innovation capability (Mikalef *et al.*, 2019), business value (Sharma *et al.*, 2014), identify sales ordering patterns (Cheung and Li, 2012), business model insight (Heinrichs and Lim, 2003). Research, herein, seems obsessed with solving tactical issues because of their straightforward evaluation or to scholars' approach to BI as a set of separate technologies rather than a holistic decisional paradigm.

Studies rooted in decision support empirically examined the linkage between BI support and the speed of problem identification, decision-making speed and the extent of analysis (Leidner *et al.*, 1999; Leidner and Elam, 1993; Leidner and Elam, 1995; Belcher and Watson, 1993; Arnott *et al.*, 2017). Still little is known about how BI collection influences decision-making. While it is true that explorative studies reveal the utility of BI collection for organizational decision-making (Ghosal and Westney, 1991; Vedder *et al.*, 1999), no empirical evidence has yet examined this belief. The outcome of BI collection on decision-making might be, as well negative than positive, at least for competitor analysis blind spots in the case of capacity expansion, new business entry and acquisition (Zajac and Bazerman, 1991). One might keep wonder about the contexts and the extent to which BI can bring value to the decision-making if scholars' attention does not shift from explorative, inductive

studies to more cross functional longitudinal ones to further delve into the relation between BI and the decision-making process.

Stream 4: the moderating effects of antecedents on the relationship between the business intelligence process and outcomes (links A-I-II-III – B-I-II-III–C-I-II-III-IV)

This stream of research is threefold, namely, research at the individual level, organizational level and environment level. At the individual level, scholars, with scaffolding in marketing research, investigated the moderating role of boundary spanners adaptive skills on BI collection sales performance outcomes (Hughes *et al.*, 2013; Mariadoss *et al.*, 2014; Ahearne *et al.*, 2013), the moderating role of the relationship between intelligence officers and strategists on boosting product innovation and generating competitive pricing strategies (Trim and Lee, 2008), the moderating effect of the relationship between district managers centrality and district BI quality diversity on salespersons' performance (Ahearne *et al.*, 2013). Unfortunately, studies rooted in management and information systems or decision support overlooked the moderating role of antecedents at the individual level on the relationship between BI process and outcomes.

At the organizational level, management scholars explored the moderating role of the alignment between business strategy and IT on the relationship between BI usage and business value (Côrte-Real *et al.*, 2019; Urbinati *et al.*, 2019), the moderating role of the relationship between the alignment of business strategy and BI analytics on BI usage and firm performance (Akter *et al.*, 2016), the moderating role of deep organizational structure on the relationship between BI usage and strategy outcomes (Audzeyeva and Hudson, 2015), the moderating role of organizational learning and ambidextrous organizational culture on the relationship between BI usage and business value (Bordeleau *et al.*, 2020) and BI usage and organizational learning (Fink *et al.*, 2016) and the mediating role of dynamic capabilities on the relationship of BI usage and firm performance (Wamba *et al.*, 2017). In like fashion, marketing scholars investigated the moderating effects of the relationships between organizational antecedents such as structural flux and perceived intelligence quality on BI usage (Maltz and Kohli, 1996), the curvilinear relationship between organizational size and BI use, as well as between marketing departments size and BI usage (Peyrot *et al.*, 2002). On the other hand, decision support scholars shed light on the moderating role of decision-making culture on the relation between the BI content quality and the BI usage (Popovič *et al.*, 2012), the moderating role of the relationship between organizational readiness and design factors on the relationship between BI usage and business value (Popovič *et al.*, 2012) and the moderating role of the information system BI infrastructure investment on the relationship between BI usage and value targets (Grover *et al.*, 2018).

At the environmental level, marketing scholars showcased the moderating role of the relationship between perceived competitiveness of the environment and the perceived value of BI quality on BI usage and organizational outcomes (Maltz and Kohli, 1996; Peyrot *et al.*, 2002). On the other hand, one study, rooted in information systems, explored the moderating role of the environment dynamism on the influence of the BI usage on value creation (Chen *et al.*, 2015).

Future research

35 years of BI process research seemed fragmented and scattered around similar areas, with scant initiatives to weave strands of lookalike contributions into one unifying paradigm. Research spawned a considerable number of articles partly prescriptive, partly explorative, revealing discrepancies between theory and practice across the BI process, antecedents and outcomes. Figure 3 displays the covered and underexplored areas in each of the

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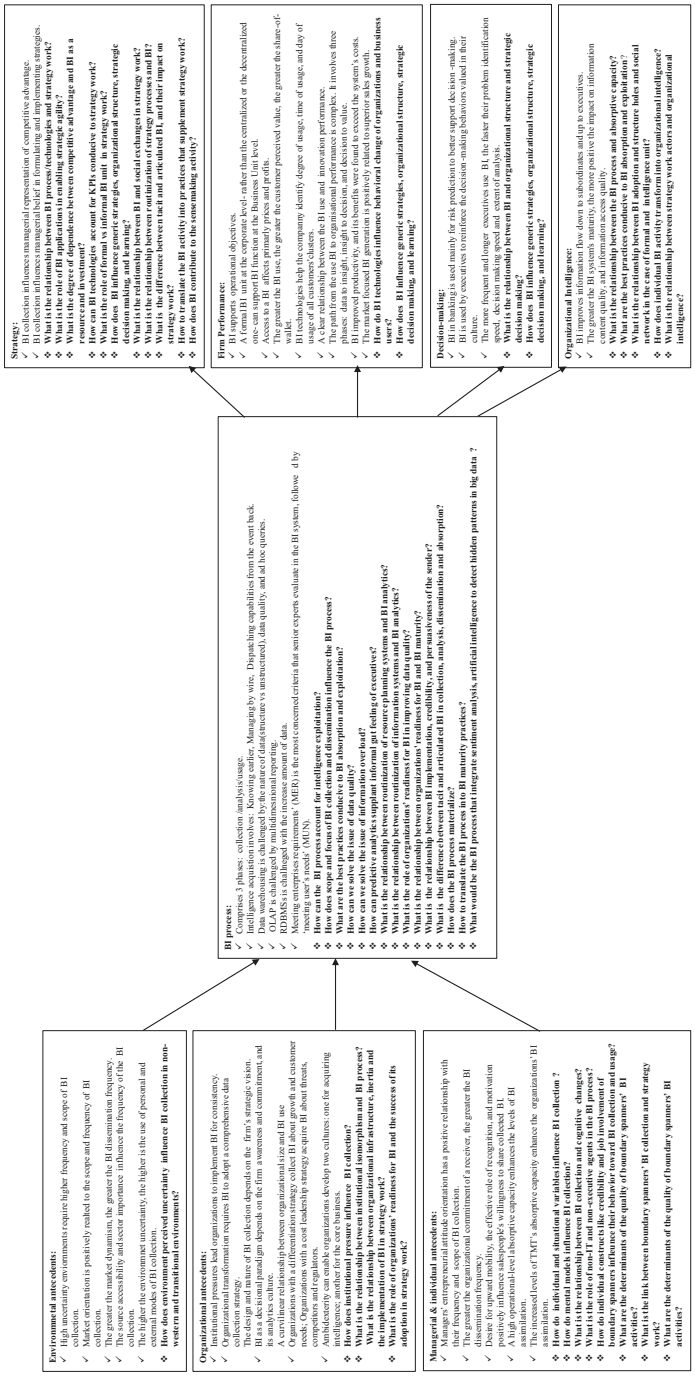

Figure 3.
Synthesis of the covered and remaining areas of the literature

aforementioned streams. Antecedents exploring studies focused on the supply side of the market to formulate viable strategies for an existing industry. These contributions unanimously adopted an outside in perspective, examining the external environmental influence on the frequency and mode of BI collection. They adopted the same structuralist approach to different business environments and neglected the influence of cultural factors and institutional pressures on the BI process. Another limitation of this stream is the exclusiveness of collection activity to executives, rather than the organization as a whole, following a top-down approach in an apparent discontinuity from the literature on bounded rationality that grant executives limited capacity to fathom the dynamism of the environment.

The significant focus on the environment as the primary antecedent of BI collection marginalized discussions on organizational factors susceptible of influencing the BI process. For instance, the ramifications of one single event on the BI use of multinational corporations in different settings. In this vein, managerial heterogeneity seems a potential frontier for research through which scholars shall compare heterogeneous teams to homogeneous groups of executives' vis-a-vis their uncertainty perception and use of the BI process. Additionally, researchers still need to investigate, which structure represents an environment ripe for effective BI use: organic or mechanistic structure. Similarly, the causation link between strategic orientation and BI process is still vague, despite some studies suggest a one-way association from strategic orientation to BI collection. Moreover, contrary to the trend line of recommendation positing the BI process at the outset of the decision-making or the strategic management process, the authors of the article at hand personally encountered situations, in monopolistic economies, where the BI process was regarded more as legitimacy tools that solidify an already taken decisional or strategic choice. As a corollary, it might be crucial to incorporate the singularity of the decision-making process in developing countries, when hypothesizing coming empirical studies. Another trend line across studies examining BI use is the focus on the receiver's trust in regard to the intelligence sender. Nonetheless, this latter's willingness to share intelligence was treated as a given, while it is far from being the case. Particularly, in developing countries where information is shared among individuals pertaining to the same interest groups. It becomes, hence, evident to account for the sender's trust and influence on the BI dissemination and use, in future research.

In addition, cognitive factors of managers and boundary spanners were rarely on the scholars' agenda. After all, the environmental uncertainty is a matter of interpretation, which, in turn, is framed by intrinsic factors rooted in the person's background. More studies, in this respect, should incorporate elements such as age, gender and personality traits. Moreover, the rationale behind decision-makers' BI collection behavior still appears ambiguous, for there seems to be no evidence regarding the value it adds to their mental models. Another overlooked matter by scholars, caught in an everlasting development of new ways of codifying structured and unstructured data, is the ability of the BI process to acquire and communicate tacit knowledge. Another gap worth mentioning is the scarcity of studies comparing BI practices of multinational corporations in the western world to emerging countries, in a world where anything might happen any second, where new technologies disrupt the status quo of businesses, economies and political regimes. The Covid-19 epidemic, political upheavals or data privacy issues present an opportunity for researchers to examine the linkage between the BI process and strategic agility let alone employees' and organizations' privacy and readiness for disruption.

Finally, a myriad of research methods was adopted by scholars, to delve into issues related to the BI process phases ranging from bibliometric studies, surveys and case studies. Some were conceptual papers, whereas others field tested their hypotheses or settled for laboratory experiments. Except for qualitative exploration examining linkage between

BI transformation to decision-making success, benchmarking data mining or data warehousing applications against commercial products marked most BI transformation studies, let alone the quantitative exploratory and conceptual articles representing a common trend across studies tackling BI collection. The absence of comparative studies urges researchers to invest time and money probing differences across industries, not in an exploratory superficial manner, but more as a longitudinal thorough analysis depicting whether or not the industry type is a contributing factor to the BI process. Longitudinal studies were, surprisingly, absent, notwithstanding their presence in multiple scholars' future directions. Another advantage longitudinal studies shall have is related to the evaluation of prototypes and technologies in an accurate manner, encompassing the residual value of such applications on the organizational learning. Longitudinal studies might also enable scholars to tap into cognitive changes prior and after BI collection and usage and track front line managers intelligence use as they assume high level positions. With that said, studies shall alter to a more dynamic view of the environment capable of capturing all the various interactions among its constantly shifting elements.

Practical implications

Nowadays, confidential strategies and tactics are swiftly replicated; the sustainability of the competitive advantage is no longer a result of a secret recipe. Managers shall recognize that room for intuition is shrinking as the need for a rational predictability is rising. Therefore, it seems wiser and beneficial for managers to tear down their walls, and engage in double loop learning with scholars, should they want a better real time decision-making and strategic agility. This review carries some implications for practitioners and particularly the role they ought to play should they seek actionable intelligence as an outcome of the BI process. Across the studies this review examined, managerial reluctance to open their intelligence practices to close examination was omnipresent. Although their apathy is understandable, due to their frustration regarding the lack of measurability of intelligence constructs, managers manifestly share a significant amount of responsibility in turning out explorative and descriptive studies partly due to their defensive managerial participation. Interestingly, managers would rather keep an ineffective BI unit confidential than open it for assessment in fear of competition or bad publicity. Therefore, this review highlights the value open participation of managers in longitudinal studies could bring to the BI research and by extent the new open intelligence culture across their organizations where knowledge is overt, intelligence is participative, not selective and where double loop learning alongside scholars is continuous. Their commitment to open participation and longitudinal studies will help generate new research that better integrates the BI process within its context and fosters new measures for intelligence performance.

Conclusion

Although far from completeness, this systematic review strived to synthesize the BI process body of knowledge via an integrative process framework that pinpoints to areas of redundancies and research gaps where scholars' attention should be directed. It is hoped that this article will encourage researchers to change perspective and adopt a more comprehensive view of the BI process aimed at contributing to its organizational context and focus its attention on the interrelationships across the BI process, antecedents and outcomes. Drawing from Levy and Ellis (2006) and Webster and Watson (2002), we sought comprehensiveness from four databases and quality from the ABS ranking list. Therefore, this paper excludes conference papers and book chapters. A caveat regarding the 26 keywords of this study is worth mentioning, as there might surely be some articles that the query strings failed to retrieve; let alone in-press- publications, not yet available when

the database search took place. Notwithstanding, a backward search of references allowed the verification of this review's comprehensiveness, gauged near completion when no new concepts were identified in the literature set (Webster and Watson, 2002). However, the material upon which this scrutiny is based epitomizes an open invitation for other researchers, to compare and test whether or not the results herein stand up to close examination. After all, this is the ultimate way to expand and enrich the body of knowledge probing BI process research.

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Technology Innovation Management Review September 2020 (Volume 10, Issue 9)

Seeking 'Strategy' in Business Intelligence Literature: Theorizing BI as part of strategy research

Yassine Talaoui, Marko Kohtamäki, and Risto Rajala

> "Business intelligence is not just about turning data into information, rather organizations need that data to impact how their business operates and responds to the changing marketplace."
>
> Gerald Cohen
> CEO and founder of Information Builders

This paper connects the business intelligence (BI) literature with research in strategic management by plotting the existing research strands on BI: environmental scanning, competitive intelligence, executive information systems, and business intelligence, against the strategic dimensions of a) orientation (External vs. Internal), b) focus (Content vs. Process), and c) practice realms. The article accordingly offers a new re-conceptualization of BI as a strategic artifact across four strategic clusters: BI as a system, BI as a planned process, BI as a product, and BI as a decisional paradigm. This conceptual article contributes to the literature by integrating disparate views on BI and placing them within the content, process, and practice streams of strategy research.

Introduction

In today's digitized world, executives need constant access to improved real-time knowledge regarding internal layers of their organizations, along with happenings in the external business environment (Howson, 2014). They, nevertheless, face challenges in making sense of data, and assimilating and using the resulting intelligence for strategic decision-making. This conundrum is due to a fragmented business intelligence (BI) research landscape (Talaoui & Kohtamäki, 2020) that has generated a proliferation of BI conceptualizations, which in turn has begotten overlapping views of BI at the operational and strategic levels. The proliferation of diverse concepts nurtures discrepancies between the intelligence executives need and what they receive. To date, BI research still desperately overlooks the strategic element of BI artifacts that are capable of providing measurable, and actionable information that bolsters executives' strategic decision making. This state of affairs calls for conceptual development that integrates the disparate views on BI (Hart, 1998) and connects them in a more coherent way with strategy research.

Against this backdrop, we inductively derive four views of BI from 120 articles spanning 35 years of research: a product view (Watson et al., 1991; Volonino et al., 1995), a process view (Calof & Wright, 2008; Dishman & Calof, 2008; Wright et al., 2009), a system view (Kohavi et al., 2002; Chung et al., 2005; Chaudhuri et al., 2011), and a view of BI as a decisional paradigm (Cheng et al., 2009; Holsapple et al., 2014). We then plot the four BI views against macro dimensions of strategy research: a) orientation (External vs. Internal), and b) focus (Content vs. Process). In addition, we also connect BI with strategy as practice research by juxtaposing each of the BI views against c) the practice realms of strategy work (institutional, organizational, and episodic). Overall, this paper provides an overarching conceptual view of BI and connects it with both macro and micro levels of strategy research.

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Uncovering BI Views

This paper adopts a systematic methodology to distill peer reviewed articles published in the top-tier journals (ABS4/ABS3) from 1985 until 2020, thus including early landmark works of environmental scanning and business intelligence, such as Sawy (1985), Lenz and Engledow (1986b), Lenz and Engledow (1986a), and Ghoshal and Kim (1986). For this purpose, four databases were selected for the search: ABI/Inform, EBSCO academic search elite, EBSCO business premier, and Emerald journals. We used Boolean operators ("AND" and "OR"), as well as asterisk wildcards to concatenate 35 keywords and generate query strings. The presence of at least one keyword in the title, keywords, or abstracts, determined the preliminary selection of the article:

> "Action* Intelligence" OR "Account* Intelligence" OR "Business Intelligence" OR "Business Analy*i*" OR "Competit* Intelligence" OR "Compet* Analy*i*" OR "Commerc* Intelligence" OR "Customer Intelligence" OR "EIS" OR "Environment* Scann*" OR "Environment* Analy*i*" OR "Financ* Intelligence" OR "Knowledge Intelligence" OR "Market* intelligence" OR "Market* Research" OR "Market* Analy*i*" OR "Network Intelligence" OR "Open Source Intelligence" OR "Operational intelligence" OR "Organizational intelligence" OR "Product* Intelligence" OR "peripheral vision" OR "Rational Intelligence" OR "Strateg* intelligence" OR "Strateg* competitiveness" OR "Srateg* Analy*i*" OR "strategic alliance intelligence" OR "Strateg* technolog* foresight" OR "Sales intelligence" OR "Service intelligence" OR "Executive information System*" OR "Industr* intelligence" OR "Indust* research" OR "Indust*Analy*i*" OR "Tactic* intelligence".

After scanning the titles, eliminating duplicates, and reviewing the abstracts, only 120 articles conceptualized the BI artifact, and therefore made the final sample. As Figure 1 illustrates, we followed Nag, Corley, and Gioia (2007) to analyze the articles for key findings and inductively distill third order categories and second order themes, as well as to derive four aggregate views of BI: BI as a product (26 Articles), BI as a planned process (36 Articles), BI as a system (34 articles), and BI as a decisional paradigm (24 articles).

From this volume of publications, one can say we know a considerable amount about BI and its conceptual underpinnings, although explanatory studies that depict concrete frameworks of analysis and ways to coherently measure intelligence value have yet to come. The choice to uphold multiple disparate definitions at the same time led to a fragmented literature, not to mention discontinuity between concept descriptions and their defined strategic roles. Missing strategic thinking appears to be common across the four research streams related to BI.

It thus seems now is a suitable time to connect BI to the strategy literature within which the need for BI is manifested at different schools of strategy work. These schools include content (Porter, 1991; Rumelt et al., 1994), process (Chakravarthy & Doz, 1992; Van de Ven, 1992), and practice (Johnson et al., 2003; Whittington, 2007). Closer scrutiny of the literature has now uncovered shades of strategy content and process schools, and strategy practice stream. Juxtaposing the four BI views with three strategic variables: environment layer, strategic focus of analysis, and realms of strategy practice, enabled us to connect BI views to the outside-in and inside-out perspectives of strategy as illustrated in Figure 2. Likewise, we were able to place the four views within the realms of strategy as practice research, indicated in Figure 3.

In the following two sections, we aim to bring together the four BI views and the three schools of strategy research in an attempt to delineate how each BI view is implemented on the strategy levels of analysis.

Bringing BI Views to the Strategy Content and Process Realms

BI as a product

Together environmental scanning and competitive intelligence (CI) represent the main constituents of BI within this dimension. They adopt an outside-in perspective that considers information collected about an external environment as the intelligence product itself. Thirty years of research has turned out vast amounts oriented towards information acquisition, which unless analyzed, remains of no avail and little value to decision makers. While some scholars have advocated information analysis, the focus and objective of such an evaluation has been largely missing (Vedder et al., 1999; Dishman & Calof, 2008; Wright et al., 2009). The lines of thinking underlying BI as a product dimension, nonetheless, seems to consort with the positioning school of strategic management, which,

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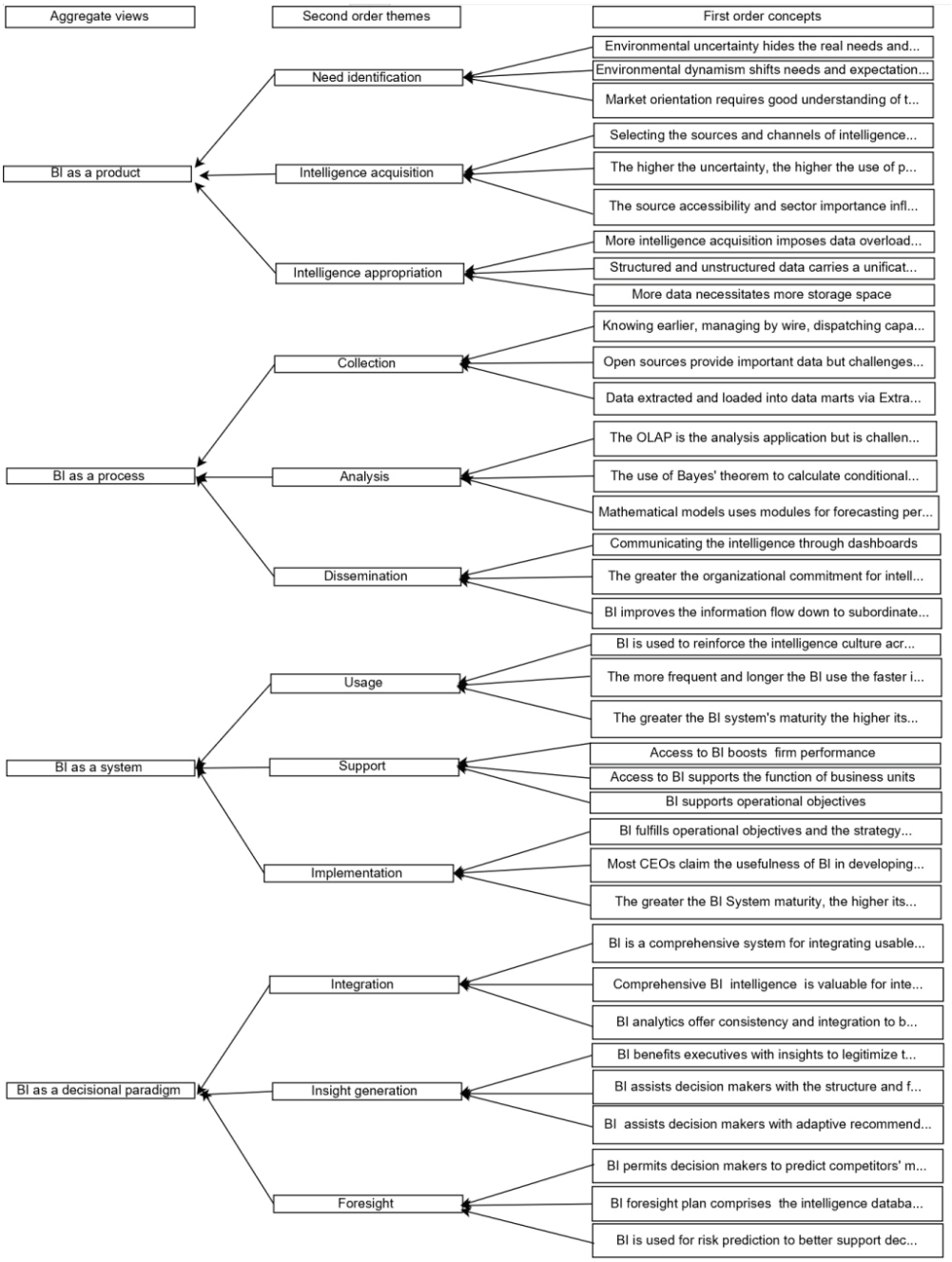

Figure 1. The 4 BI views derived inductively out of third and second order categories from the literature.

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thanks to its excessive external focus, posits that a firm's capacity to create and sustain competitive advantage hinges on how well it positions itself within its industry (Hoskinsson et al., 1999). Put differently, competitors' positioning along existing structural conditions of the industry have been claimed as primary determinants of company performance (Mintzberg et al., 1998).

In this vein, Porter's 1980 five forces analytical framework has allowed firms to assess their performance through scrutiny of their positioning within respective industries, as well as estimating their bargaining power vis-à-vis existing or potential rivalries (Rumelt et al., 1994). The five forces appraisal, while mostly quantitative, has been deemed essential for generic strategy formulation, in drawing a clear picture of industry structure (Porter, 1980; Mintzberg et al., 1998). Strangely, heuristics found within the positioning school are constantly mentioned by companies and appraised by scholars falling within this dimension, although no research so far has attempted to link BI constructs to the positioning paradigm of strategic management.

Furthermore, through primary human or open sources, environmental scanning and CI academics try to detect trends or events that might occur in the external environment that may jeopardize organizations' CI (Xu et al., 2011; Zheng et al., 2012). The rationale here stems from the new dynamics of business environment after the internet bubble of the late 1990s. During the last two decades, a new reality has emerged: competitive advantage is transitory and ephemeral. This fact broke with the positioning school's premise in favour of taking a competitive dynamics approach, wherein firm performance hinges upon effective action/reaction responses (Chen et al., 2012). Once again, prescriptive environmental scanning and CI research overlap with strategic management through competitive dynamics, and consequently comprise BI as a product dimension. This dimension combines environmental scanning and CI with two outside-in content schools: the positioning school and a competitive dynamics research stream. By doing this, BI as a product cluster puts two BI constructs into corresponding strategic context and holds twofold endeavours: (1) supplementing the existing theoretical framework of industry analysis that has long been criticized for its static nature and inability to sense industry alterations (Kim & Mauborgne, 2004), and (2) acknowledging the complementarity of both strategic management schools, by merging their underlying units of analysis, industry and products (Teece et al., 1997), as two crucial sides of the intelligence continuum.

BI as a planned process

This dimension draws from a myriad of studies adopting the CI process or cycle as a reference to evaluate firms' intelligence practices (Wright & Calof, 2006; Dishman & Calof, 2008; Fleisher, 2008). Such a process is composed of four steps: planning, collection, analysis, and dissemination. Put differently, the entire intelligence sequence hinges on a clear delineation of objectives and needs before subsequent stages are triggered. This CI cycle has enjoyed much interest since the late 60's, and is likely to continue its pace, particularly among the Society of Competitive Intelligence Professionals (SCIP). Although, CI practitioners were heavily focussed on the collection phase, likewise scholars advocated for an intertwined cycle that lays the building bricks of actionable intelligence.

Ostensibly, the intelligence is gauged as actionable if it limits executives' intuitions and feeds their rational decision making through a full gamut of activities. These range from an accurate assessment of data validity and quantitative analysis for underlying patterns to imparting knowledge with numerical face value. Needless to say, such a set of actions requires proper intelligence creation, while delivery stems from marketing research. This rational and prescriptive tradition shares a discernable similarity with Ansoff's (1965) planning school of strategy. In other words, both the CI process and strategy planning school draw upon a linear sequential model of development to generate intelligent solutions for wicked issues in strategy formulation (Mason & Mitroff, 1981).

Accordingly, strategy formulation result from a formal, sequential, and rational process comprised of closely weaved phases (Huff & Reger, 1987). At the same time, for the planning to succeed, strategies and objectives ought to be carefully explicated throughout an organization, along with establishing the need for a stable structure that behooves this iterative, if not strenuous, duty (Rialp-Criado et al., 2010). Surprisingly, the regular disparity between needed and produced intelligence has so far been misinterpreted by most scholars, who have opted to delve into the prowess of formalizing intelligence units, or favored a project-based approach for the entire intelligence process (Prescott & Smith, 1987; Ghosal & Westney, 1991).

This paper, therefore, suggests a similarity between the planning school and CI cycle, and places the latter within the confines of the former. Both are rooted in a rational-formal synoptic model and adopt a systematic,

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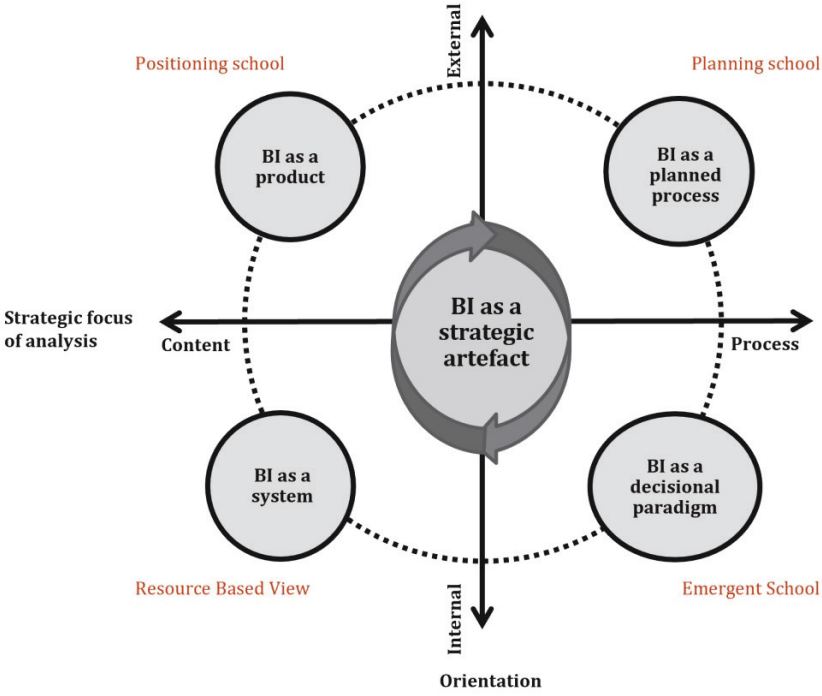

Figure 2. BI views against the outside-in and inside-out views of strategy.

comprehensive, and exhaustive analysis approach to the environment prior to decision execution (Fredrickson & Mitchell, 1984). Such an integration of CI cycles into the planning school is presumably considered key to synchronizing between what is needed at the top and what is offered as an intelligence outcome. Only then will rational strategy formulation supplant intuition.

BI as a system

To bridge the gap between the business user and information access, BI applications ranging from data warehousing, online analytical processing (OLAP), data mining, extract-transform-load (ETL), and user interface provide a company's executive information system with the necessary technologies to process huge volumes of unstructured data, in order to present it in a timely manner to executives. Whereas the research debate stressed WEB 2.0's information overload and the type of business user (executive vs. line manager) receiving the intelligence, studies addressing the strategic importance of such technologies are, unfortunately, nonexistent.

Ultimately, investing in state-of-the-art technologies to decipher meaning out of noisy internal and external data is necessary for companies to strive forward in today's turbulent business environment. However, if such technologies are not seen as a means to competitive advantage, then the continuous investment in updating and developing this arsenal will eventually come to an end. This implies an inside-out perspective to strategy formulation whereby focus shifts to the firm's internal capabilities as a determinant of its strategy and competitive advantage (Hoskinsson et al., 1999). In this respect, firms may earn above normal returns, by identifying and acquiring resources, for instance, BI technologies that are critical to the development of demanded products (Newbert, 2007). These resources are, nonetheless, heterogeneously distributed across competing firms and are imperfectly mobile, which in turn makes the heterogeneity persist over time (Barney, 1991). Firms owning valuable and rare resources would a priori attain a competitive advantage and enjoy improved performance in the short term (Barney, 1991).

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This rationale, however, seems dubious in the context of volatile and unpredictable environments as it fails to address the influence of market dynamism and firm transformation over time (Wang & Pervaiz, 2007), let alone the ambiguity surrounding processes whereby resources yield competitive advantage (Barney, 2001). The latter involves making better use of resources by allocating them in such a way that maximizes performance (Mahoney & Pandian, 1992). In this respect, once a firm's valuable resources are properly leveraged, competitive advantage should hence be obtained (Peteraf, 1993).

Evidently, competitive advantage emanates from a combination of resource possession and resource exploitation, which is best captured under two theoretical approaches within the resource-based view: the VRIO framework (Barney, 1997), and the dynamic capabilities approach (Teece et al., 1997). Whereas the former stresses a firm's need to organize for full exploitation of its VRIN resources to potentially attain competitive advantage, the latter specifically defines the types of processes by which firms could reconfigure those resources (Teece et al., 1997).

As conjectured earlier, this line of thinking views BI technologies as necessary but not sufficient for a firm's competitive advantage. It ascertains that above normal rents are earned once firms possess and are capable of replicating routines, whereby resources can be coordinated and deployed. Resources themselves are thus seemingly of no real value to the firm in isolation. Instead, their latent value can only be made available to the firm via idiosyncratic dynamic capabilities (Eisenhardt & Martin, 2000), which: (a) are built rather than bought, (2) reflect a firm's ability to integrate, build, and reconfigure internal and external competences, (3) creation and evolution are embedded in organizational processes that are shaped by firms' asset positions and development paths adopted in the past (Barreto, 2010). In addition to the resource reconfiguring capability, two other sets of capabilities should be considered: the capability to sense and shape opportunities and the capability to seize them (Teece, 2007).

Ultimately, sustainable competitive advantage does not rely solely on dynamic capabilities themselves, but also on resource configurations through BI applications that permit using dynamic capabilities "sooner, more astutely, and more fortuitously than the competition" (Eisenhardt & Martin, 2000). In this respect, BI technologies, along with EIS form the basis for a firm's capabilities to create and sustain competitive advantage (Collis, 1994).

BI as a decisional paradigm

Although some studies have pictured BI as a decisional paradigm, their line of thinking has preached formal alignment between analytical culture, BI technologies, and the business unit (Holsapple et al., 2014). Put differently, this means supporting real time decision making through a combination of BI techniques (cube and ad hoc query analysis, statistical analysis, data mining) with a standard knowledge management process (knowledge retrieval, storage, and dissemination) to generate data, select and manipulate it (Cheng et al., 2009). The validity of such an argument depends on the kind of environment: benign vs. uncertain. While in the former, BI may be utilized for long-term strategic planning, in the latter, BI facilitates adaptation and strategic learning.

This seemingly dimension arises as the missing part of our puzzle. For BI to succeed as a decisional paradigm, an inside-out orientation is necessary, but not sufficient, as it should reckon business interactions with the external environment that imply unintended outcomes of the strategic process (Cyert & March, 1963). Strategy then becomes the result of adaptive opportunistic behavior rather than a plan, for the process is fragmentary and unpredictable, in which intended strategies frequently lead to unintended results (Mintzberg & Waters, 1985). In this regard, both strategy formation and implementation arise as inseparable and indistinguishable processes (Mintzberg et al., 1998). As a corollary, trial and error, continuous learning, and a two-way flow of information emerge as key determinants for resilient, astute real time decision making (Quinn, 1980; Mintzberg, 1987).

Meanwhile, learning is not exclusive to managers who are limited cognitively due to bounded rationality, but permeates the entire organization through a new culture and behaviour that favours retrospective thinking (Quinn, 1980; Mintzberg, 1987), and exudes considerable recognition of the contextual role in strategic thinking (Ezzamel & Willmott, 2004). Therefore, unlike the aforementioned dimensions, this article presents the fourth dimension of the literature in line with the processual school of strategy, wherein decision making process is unpredicted, and associated with a continuous learning process (Whittington & Cailluet, 2008). This double-loop, often triple-loop, type of learning depends on BI to provide the necessary inputs

for incessant modifications to better cope with contextual changes before strategy can be formed in a collected and descriptive manner (Mintzberg & Waters, 1985; Balogun & Gleadle, 2005).

Placing BI within the Three Realms of Strategy as Practice

BI as a system within the strategy realm

Research rooted in information management and oriented toward technologies that drive intelligence currently offer potential within the operational realm, not to mention carrying a would-be role for accompanying the organizational realm. Research so far has been concerned a great deal with developing the ultimate BI software capable of generating reliable intelligence. This in turn has yielded hands-on technologies that are responsible for converting structured as well as mostly unstructured data into a homogenous piece of knowledge that reflects the actual conduct of business units. This episodic focus is achieved through an application dubbed extract-transform-load (ETL) because it alleviates heterogeneity and load extracted data into a data warehouse. The latter result contributes much to the organizational realm, thanks to a relational database management system (RDBMS) that enables business users to execute queries across a wide range of data.

The organizational focus is further corroborated by an online analytic processing (OLAP) server, which is tasked with deciphering patterns across data to better fathom competition and strategic change. In this regard, OLAP offers organizational actors the possibility to slice, dice, and drill down into data, and then to display it in a user friendly manner through dashboards or spreadsheets that constitute the interface for a decision support system (DSS), also known as an executive information system (EIS).

Finally, the potential role of BI technologies within the institutional realm is not as straightforward as one might think, despite the ability of data mining engines to "predict" scenarios vis-à-vis the focal firm's environment (March & Hevner, 2007; Chaudhuri et al., 2011). Besides the difficulty of predicting accurate scenarios, the currently rudimentary routines of companies to acquire external data also impedes the capability of data mining from making sense of the institutional realm. Thus far, research has addressed the potential role of BI technologies within the three strategy realms, yet more empirical research is needed to highlight how BI as a system shapes and is influenced by each realm.

BI as a product within the strategy realm

In line with the structure-conduct-performance paradigm and influenced by "industrial organization" (IO) economics, strategic management scholars have nurtured a particular interest in the structure of a given firm's industry as crucial to formulating viable business strategies. Their outside-in perspective has been referred to as environmental scanning and shares discernable synergy with the institutional realm, as it

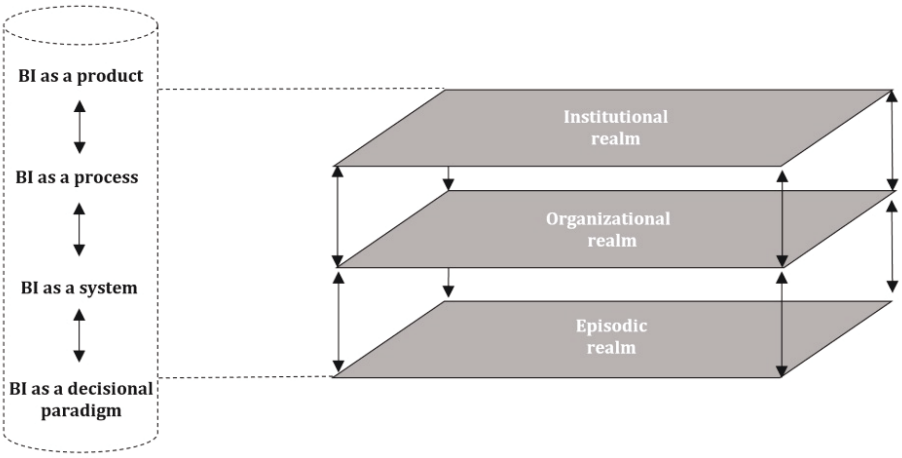

Figure 3. BI views against the three realms of strategy as practice.

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strives to make sense of the task environment (which includes any area directly linked to the organization's operations, such as customers, competitors, and so forth), and the general environment (denoting all sectors remotely connected to the organization including government and economy) (Daft et al., 1988).

Nowadays, such market focused intelligence is generated through third party sources, customer reviews, and Web 2.0's overwhelming loads of information. These three modes represent major bases upon which CI is created within 21st century organizations. Whether developed internally or acquired by market researchers, mainly Nielsen, the operational efficiency concern of CI bears a striking resemblance to the organizational realm. Put differently, the acquisition techniques of CI through the mining of customer reviews or the inference of competitive measures (market share, competitors' share of wallet) seeks potential weaknesses or strengths of competitors' products or services in order to avoid competition and anticipate strategic change (Zheng et al., 2012).

Unfortunately, strategic management and marketing scholarship that has been preoccupied with strategic uncertainty and awed by the heuristics of Porter's positioning school, has produced much quantity aimed at the institutional realm, which however disregards the distinctive competence and capabilities of organizational actors. This in turn has engendered a challenge to trace the BI construct to the episodic realm. It has thus become evident that the extant literature has failed to notice the interplay between the three realms indicated above, which is reflected in the paramount weight given to the institutional realm, and a shocking lack of episodic level analyses engrained in many firms' resource base. Needless to say, though the many contributions of marketing scholars have benefited the organizational realm, their customer-oriented approach has accidently coincided with operational efficiency, while missing the CI entrenched in a business model's set of activities.

BI as a process within the strategy realm

BI as a process is by far and large the construct with the most prescriptive and descriptive studies. This state of affairs, fueled by a desire to bridge the gap between business users and their BI system, has lured researchers to reduce the time cycle from data collection to imparting knowledge via casual visualization that aims at simplifying common quantitative displays of data (Kohavi et al., 2002).This communication seemingly follows a predefined process that could be traced to the episodic and organizational realms. The episodic realm permeates the acquisition of internal data that exposes the distinctive competence of a company, its activities, and actors, while the latter shifts attention to the transformation of data into consistent and coherent actionable intelligence that serves immediate operational analysis or awaits more variables to foster sense making (Chen et al., 2012).

The organizational realm holds within its confines a striking disappointment for most readers, due to the absence of any tested analysis tools that are proficient in examining data according to different scenarios of consequence for competitive dynamics. Lastly, communication and intelligence sharing throughout an organization has been called for by scholars and mangers alike, despite the clear deficiency in comprehending the institutional realm. Along with its linkage to the aforementioned dimensions, this ultimately drives the persisting conflict and divergence between intelligence needed at the top and intelligence conveyed bottom up.

BI as a decisional paradigm within the strategy realm

As mentioned earlier, BI as a decisional paradigm hinges on the continuous input of intelligence needed for making necessary amendments prior to and during the strategy formation process, which involves trial and error learning (Quinn, 1980; Mintzberg, 1987). This BI dimension in tandem with the processual school of strategy carries also a synergy in accordance with the institutional realm, thanks to giving the utmost consideration to interactions with the external environment, due to the tension it exerts upon the decision making process (Whittington & Cailluet, 2008). On the contrary, the emphasis information management scholars have given to studying the impact of internal environments on BI as a set of core resources, has discovered a clear association between intelligence assimilation and managerial absorptive capacity (Elbashir et al., 2011).

Ostensibly, better intelligence assimilation needs to be supported by potential absorptive capacity (ACAP), which enables information acquisition and assimilation (Lane & Lubatkin, 1998). Regrettably, unless or until such a relationship is explored to indicate a clear link between BI and either potential absorptive capacity (ACAP) or absorptive capacity (RACAP) (Zahra & George, 2002), one cannot conjecture any role for BI in delineating the understating and motives that drive

organizational actions taking place within the episodic realm.

Notwithstanding this fact, piecing together the tactical level with BI might not be utterly wrong, as a distinct relation seems to exist between the speed and extent of such actions and BI (Leidner & Elam, 1995; Leidner et al., 1999). This goes along with a discernable connection particularly in instances entailing prediction for mergers & acquisitions (Lau et al., 2012), and credit denial or approval (Moro et al., 2015). In contrast with the episodic level of analysis, linking BI to the organizational realm usually holds value, due for the most part to the ease of quantitatively measuring operational efficiency related constructs. For instance, resource and price optimization based on data mining forecasts from previous patterns and competitors' pricing, which ultimately enables retaliatory or pre-emptive actions with respect to competition (Heinrichs & Lim, 2003).

Conclusion

This conceptual paper aimed to integrate the BI and strategy literatures by clustering the BI body of knowledge around four BI views, which are further placed into the strategy schools: BI as a product, BI as a system, BI as planned process, and BI as a decisional paradigm. By so doing, this paper endeavoured to direct scholars' attention to the subtle strategic role of BI that has been long neglected. Thus, this paper intended to encourage a change in perspective for researchers to adopt a more comprehensive view of BI aimed at facilitating real time decision making and strategic learning (Mintzberg & Lampel, 1999). With its focus on four BI dimensions, the paper at hand has laid the first brick in a new BI wall, where more studies are expected to probe the influence of managerial cognition of BI usage and interpretation, as a way to enhance our understanding of the BI influence on strategy making. From a capability perspective, researchers should examine the role of BI to accumulate and share tacit knowledge throughout organizations. Further studies thus appear to be needed in order to shed light on the interaction between BI and different strategy constructs. In addition, we believe that taking a strategy-as-practice approach could provide fruitful grounds to study the utilization of BI technologies in management teams and middle management. This way studies can shed light on the material forms of BI systems, along with how BI systems and social practices get entangled.

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Seeking 'Strategy' in Business Intelligence Literature: Theorizing BI as part of strategy research

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Of BI research: a tale of two communities

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Abstract

Purpose – The business intelligence (BI) literature is in a flux, yet the knowledge about its varying theoretical roots remains elusive. This state of affairs draws from two different scientific communities (informatics and business) that have generated multiple research streams, which duplicate research, neglect each other's contributions and overlook important research gaps. In response, the authors structure the BI scientific landscape and map its evolution to offer scholars a clear view of where research on BI stands and the way forward. For this endeavor, the authors systematically review articles published in top-tier ABS journals and identify 120 articles covering 35 years of scientific research on BI. The authors then run a co-citation analysis of selected articles and their reference lists. This yields the structuring of BI scholarly community around six research clusters: environmental scanning (ES), competitive intelligence (CI), market intelligence (MI), decision support (DS), analytical technologies (AT) and analytical capabilities (AC). The co-citation network exposed overlapping and divergent theoretical roots across the six clusters and permitted mapping the evolution of BI research following two pendulum swings. This study aims to contribute by structuring the theoretical landscape of BI research, deciphering the theoretical roots of BI literature, mapping the evolution of BI scholarly community and suggesting an agenda for future research.

Design/methodology/approach – This paper follows a systematic methodology to isolate peer-reviewed papers on BI published in top-tier ABS journals.

Findings – The authors present the structuring of BI scholarly community around six research clusters: ES, CI, MI, DS, AT and AC. The authors also expose overlapping and divergent theoretical roots across the six clusters and map the evolution of BI following two pendulum swings. In light of the structure and evolution of the BI research, the authors offer a future research agenda for BI research.

Originality/value – This study contributes by elucidating the theoretical underpinnings of the BI literature and shedding light upon the evolution, the contributions, and the research gaps for each of the six clusters composing the BI body of knowledge.

Keywords Business intelligence, Analytics, Decision support systems, Competitive intelligence, Big data, Market intelligence

Paper type Literature review

Introduction

The extant body of knowledge on business intelligence (BI), because of its fragmented state, has overlooked to map the BI literary landscape and subsequently identify the lack of cross-disciplinary relationships between the informatics and business communities. Because of ontological and epistemological discrepancies, each of these communities produced disjointed BI research that uses a myriad of concepts interchangeably with BI and nurtured a particular focus on the needs pertaining to the operational and tactical levels. We refer to

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this divergence of research interests and progress as a dichotomy between the business and informatics communities that weave the strands of the BI scientific landscape and inhibits a comprehensive view of BI that accounts for cross-disciplinary research gaps.

Prior BI research examines the impact of environmental (Boyd and Fulk, 1996; Ebrahimi, 2000), organizational (Qiu, 2008; Ramakrishnan *et al.*, 2012), managerial antecedents (Cho, 2006; Elbashir *et al.*, 2011) and top executives' goal orientation and personalities (Pryor *et al.*, 2019) on BI quality and value. Besides, the research draws a causation link between BI and indicators of operational efficiency such as price optimization (Abramson *et al.*, 2005), sales optimization (Cheung and Li, 2012; Heinrichs and Lim, 2003; Hughes *et al.*, 2013) and innovation (Slater and Narver, 2000; Tanev and Bailetti, 2008; Trim and Lee, 2008). Unfortunately, this line of thinking yields a disparate focus on BI: on the one hand, some scholars theorize BI as a capability for market analysis (Fleisher *et al.*, 2008; Li *et al.*, 2008; Qiu, 2008), value creation (Grover *et al.*, 2018) and decision making (Merendino *et al.*, 2018; Constantiou *et al.*, 2019); other scholars conceptualize it as a prop (Wang *et al.*, 2018) or a model (Gupta and George, 2016; Brichni *et al.*, 2017) for data variety and velocity (Ghasemaghaei and Calic, 2020).

Such disjointed theoretical progress motivates this systematic literature review of 120 articles published in top-tier ABS journals from 1985 to 2020. We thereby seek to

- structure the BI scholarly community around six research clusters: environmental scanning (ES), competitive intelligence (CI), market intelligence (MI), decision support (DS), analytical technologies (AT) and analytical capabilities (AC);
- investigate the theoretical roots of six clusters that form the BI research;
- map the evolution of BI literature; and
- suggest an integrative research agenda of the informatics and business communities with clear research gaps.

We structure the rest of the article as follows. The first section presents the review process and co-citation analysis. The second section explains the theoretical roots of the six clusters that compose the body of knowledge on BI. The third section traces the evolution of its body of knowledge. The paper concludes with a future research agenda.

Method

Following Tranfield *et al.* (2003), we identified keywords based on previous reviews on BI. Boolean operators (AND and OR), and asterisk wildcard were used to concatenate keywords and generate query strings. We then systematically searched four databases: ABI/Inform, EBSCO academic search elite, EBSCO business premier and Emerald journals for relevant literature. We followed two exclusion/inclusion criteria to select our final sample: acceptability and relevance (Robey and Dalebout, 1998). Acceptability limited this review to top-tier journal articles (Vogel, 2012) covering the cross-disciplinary nature of BI research between 1985 and 2020 to include early landmark works of ES and CI such as El Sawy (1985) and Ghoshal and Kim (1986). Passing our relevance criteria meant that each of the 120 articles of our final sample carried a theoretical scaffolding in the literary landscape of BI. Appendix presents our search strings and maps the systematic research process we followed to reach our sample of 120 articles.

To reduce subjectivity and better comprehend the structure of BI research and ensure further rigor, we opted for an author co-citation analysis as the sole bibliometric method of this paper. In so doing, we sought to analyze each time a pair of authors was cited together (Acedo *et al.*, 2006; Di Stefano *et al.*, 2010; Galvagno and Dalli, 2014; Vogel and Güttel, 2013)

and identify contributors holding similar thoughts and boundary spanners based on the selected articles and their lists of references (Nerur *et al.*, 2008). VOS viewer software (Van Eck *et al.*, 2010; Waltman *et al.*, 2010) orchestrated the co-citation analysis through the VOS mapping technique (Van Eck *et al.*, 2010) that follows several parameters to generate the final network of the research landscape. Initially, we adopted a conservative analysis that generated two diverging scholarly communities (informatics-oriented vs business enthusiasts) whose theoretical scrutiny implied a further breakdown of the aforementioned communities resulting in six research clusters displayed in the following section in a graphic hassle-free map.

Theoretical roots of business intelligence research

The bibliometric analysis of articles along their references generated a co-citation network (Figure 1) displaying a BI research comprising six clusters led by two scientific communities: business and informatics. The latter community produced 58 publications: 16 articles from the AC cluster, 18 papers under the DS cluster and 24 publications by the AT cluster. The business community generated 62 articles dispersed across its three streams. Whereas the ES and CI clusters each generated 26 publications, 10 articles made up the MI cluster. As shown in Figure 1, the BI scholarly community contains five interrelated clusters and a maverick constellation of authorships around technical aspects of BI, i.e. the AT cluster. Paradoxically, this same cluster springs from the same community spawning the AC and DS clusters that both seem to nurture ties with two other clusters of the business community: CI and ES. Figure 1 also displays these links as citations of well-known strategy scholars such as Hambrick, Mintzberg, Porter, Eisenhardt and Whittington. Unfortunately, this research tradition faded away during the early 2000s when the new AT cluster took over the dominance of BI research. In what follows, we attempt to bring to light the theoretical underpinnings of BI literature by depicting the theoretical grounds of six clusters.

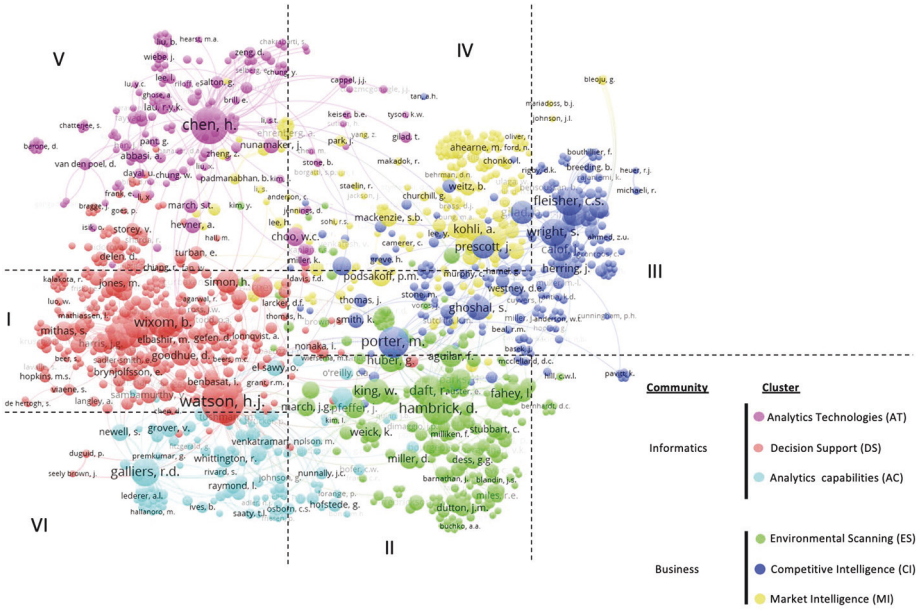

Figure 1.
Quantitative identification of the BI research clusters

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Environmental scanning cluster

Structure–conduct–performance paradigm vs organizational theory. Conceptualized as a formal constituent of the strategic management process (Aguilar, 1967; Peyrot *et al.*, 1996), ES attracted scholars' attention and produced a significant batch of conceptual and empirical papers (Daft *et al.*, 1988; Yasai-Ardekani and Nystrom, 1996; May *et al.*, 2000) that adhere to the structure–conduct–performance (S–C–P) paradigm (Mason, 1939). Thus, the dominant school of thought in the ES cluster (Quadrant 2, Figure 1) views firms' actions as rooted in the structure of their respective environment that constrain their behavior and influences their performance (Brownlie, 1994; Peyrot *et al.*, 1996). In this context, scholars with scaffolding in industrial economics formalized the concept as an activity in the strategy process for proactively scanning a rapidly shifting environment for strategic opportunities (Cho, 2006; Fabbe-Costes *et al.*, 2014; Lau *et al.*, 2012; Robinson and Simmons, 2017; Reinmoeller and Ansari, 2016).

This rationale motivated the dominant theoretical strand of ES research and pictured it as the first link activity whereby firms can comprehend their industry and remain on top of any changes (Hambrick, 1981). Contemporaneously, early remarks of ES in Cyert and March's (1963) theory of organizational behavior motivated another research stream that nurtured a particular interest in the effects of environmental elements on the scanning dimensions: scope and frequency (Peyrot *et al.*, 1996; Yasai-Ardekani and Nystrom, 1996). This research stream focused on the notions of instability and complexity as the main constituents of environmental uncertainty (Thompson, 1967; Lawrence and Lorsch, 1967; Duncan, 1972; Peyrot *et al.*, 1996), decomposed the environment into task and remote and suggested that the structures of both constituents dictate the focus of scanning activity (Thompson, 1967; Peyrot *et al.*, 1996). This latter is often pegged to top executives and their goals orientations, cognition, character, or values (Pryor *et al.*, 2019) following the upper echelons theory (Hambrick, 2007).

Competitive intelligence cluster

Managerial heuristics and atheoretical practice. In response to the shortcomings of ES (e.g. failure to deliver competitive advantage), the CI research imported the concept of competitor analysis to the intelligence equation, following Porter's (1980) seminal work (Peyrot *et al.*, 1996). The common theme across publications in the CI cluster (Quadrant 3, Figure 1) is the use of eclectic definitions of intelligence concepts that fall into two research streams: CI as a product and CI as a process. The former regards CI as the final intelligence or knowledge delivered to the business user (Chen *et al.*, 2002; Xu *et al.*, 2011; Zheng *et al.*, 2012); the latter considers it a sequential activity through which it funnels intelligence to support organizational objectives (Dishman and Calof, 2008; Liu and Wang, 2008; Wright *et al.*, 2009) and whose budgeting enhances organizational vigilance against environment uncertainty (Opait *et al.*, 2016).

As a product, the generation of ready-to-use CI from open or human sources occupies the center of the debate. As a process, attention tilts toward the transformation of gained data into usable intelligence. Although some scholars root the CI in the marketing research (Schollhammer, 1994; Dishman and Calof, 2008), we found ourselves inclined to agree with others suggesting that CI encompasses the entire business biosphere (Dishman and Calof, 2008). This research stream stressed the necessity of analysis, yet stayed prescriptive mostly with insignificant theoretical grounds except for Porter's five forces and SWOT analysis that, although rooted in strategic management, came to the fore for their high straightforwardness and low theoretical complexity. Although some works by some well-known scholars of this cluster (Ghoshal and Westney, 1991) place CI at the heart of the

strategic decision-making process, it does so in a manager-friendly manner that highlights the prowess of the SWOT analysis as a device for competitors' profiling and benchmarking.

Market intelligence cluster

Market research vs social network theory. The MI body of knowledge (Quadrant 4, Figure 1) accorded full attention to the external intelligence that carries a competitive value (e.g. customers' needs and competitors' distinctive competence) (Day, 1994; Kohli and Jaworski, 1990; Narver and Slater, 1990; Slater and Narver, 2000). In doing so, this stream generated a research driven by operational effectiveness rather than strategy: gaining MI and fostering best ways to meet or exceed market demands and expectations (Day, 1994; Slater and Narver, 2000). This research is grounded in Nielsen's market measures and the Dirichlet literature that offer market enthusiasts a myriad of competitive indicators (e.g. market share and market penetration) to test the firm's operational effectiveness (Farris *et al.*, 2006; Zheng *et al.*, 2012). Strangely enough, this research practice pursued its focus in an outright overlooking of the organizational level of intelligence, particularly the focal firm's resources and distinctive competence.

Two research stands within the MI cluster exhibited an interest in the organizational and individual levels of intelligence. The first stream explored the dissemination and exploitation of gained intelligence relying on social exchange theory (Homans, 1961), the role of hierarchical relationships (Huber and McDaniel, 1986), power and politics in the relationships between the intelligence sender and receiver (Maltz and Kohli, 1996) and disaggregated product–firm–market-level intelligence to yield firms better resource allocation (Kumar *et al.*, 2020). The second stream's attention was directed to boundary spanners' activities vis-à-vis the collection and usage of intelligence and drew from both the cognitive selling paradigm (Kahaner, 1997; Rothberg and Erickson, 2005; Fleisher *et al.*, 2008; Rapp *et al.*, 2011; Mariadoss *et al.*, 2014) and expectancy theory (Tyagi, 1985; Sujan, 1986; Le Bon and Merunka, 2006).

Decision Support cluster

When strategic management and organization theory meet information systems. Originating from works on computerized decision support systems (DSS) and executive information systems (EIS), the extant literature propeled this cluster toward supporting the decision-making process via a cross-organizational integrated technology and customized user interfaces (Volonino *et al.*, 1995; Walters *et al.*, 2003). The ubiquitous argument across the DSS cluster (Quadrant 1, Figure 1) research is the alignment of organizational structure and technology with the environment as a key element in achieving competitive advantage or what some refer to as survival if one substitutes firms with organisms (Huber, 1984). This logic is grounded in contingency theory (Burns and Stalker, 1961; Lawrence and Lorsch, 1967) and systems theory (Miller, 1972; Boulding, 1981). Other scholars also voiced the S–C–P paradigm and Chandler's "structure follows strategy" as a theoretical tutelage behind this cluster's focus on structure (Huber, 1984; Volonino *et al.*, 1995). The DS narrative finds theoretical grounds in the Gorry and Morton (1989) framework and Simon's (1947) model of decision-making that follows a three-phase iterative sequence of gathering intelligence, building options and selecting the best-case scenario (Aversa *et al.*, 2018; Arnott *et al.*, 2017).

Another prevalent thinking across this literature is the premise that technology is a material that is transferable and controllable (Gherardi, 2000; Petrini, and Pozzebon, 2009). This requires flat organizations with decentralized decision-making and centralized control (Drucker, 1989; Volonino *et al.*, 1995). This argument stands on two legs: organizational ecology (Hannan and Freeman, 1977; Carroll, 1990), which determines that, in dynamic

environments, firms' restructuring follows high performers, and transaction cost economics (Williamson, 1983), which associates high control with a low number of transactions and transaction costs (e.g. technologies and associated costs) (Volonino *et al.*, 1995).

Analytical Technologies cluster

An ad hoc technical research. In the early nineties, BI emerged as a term to coin the technologies at the core of the DSS and EIS and nurtured scholars' desire to bridge the gap between the business user and business AT. This state of affairs lured researchers to focus on reducing the time cycle from data collection to knowledge impartment via a casual visualization that simplifies the quantitative displays of data (Kohavi *et al.*, 2002). Web 2.0 and the technological advancement of the new millennium engaged scholars in continuous development of new ways of codifying structured and unstructured data yielding research that resembles more a benchmark of commercial technologies with in-house developed ones or an update of some technical flaws pegged to existing applications.

A common trend of this cluster (Quadrant 5, Figure 1) is the ad hoc upgrades of the intelligence architecture following the functional linguistic theory or sentiment analysis (Abbasi and Chen, 2008; Lau *et al.*, 2012). Besides, an evaluation of the proposed prototypes based on the analytic hierarchy process (Lin *et al.*, 2009), or against commercial engines seems prevalent (Chau *et al.*, 2007; Chung *et al.*, 2005; Srivastava and Cooley, 2003). Hence, our nomenclature of this cluster as ad hoc for it represents research in constant flux that shadows a commercial rationale of tracking enterprise intelligence infrastructure, detect faults, correct algorithms and upgrade technologies (Lin *et al.*, 2009). This tradition also characterizes another stream of research within this cluster that develops indices or models to test and test the analytical capability (Gupta and George, 2016; Brichni *et al.*, 2017) or predictive sensing (Hallin *et al.*, 2017) of BI against software development systems such as ISO 25000 (ISO, 2014) or models based on fuzzy TOPSIS techniques (Rouhani *et al.*, 2012).

Analytical Capabilities cluster

Practice theory vs knowledge-based view. Contrary to the tradition of informatics research where BI enjoys a supportive role in decision-making, the AC cluster (Quadrant 6, Figure 1) broadens BI impact to comprise all organizational processes and the knowledge work and business value in particular (Akter *et al.*, 2016; Bordeleau *et al.*, 2020; Shollo and Galliers, 2015). The first stream of this cluster builds on the knowledge-based view (Grant, 1996): dynamic capabilities (Teece, 2007) and organizational learning ambidexterity (Jansen *et al.*, 2009) view knowledge as a rare and valuable resource that yields competitive advantage once leveraged (Côrte-Real *et al.*, 2017; Côrte-Real *et al.*, 2020; Côrte-Real *et al.*, 2019). The BI value stems from its ability to enable this leveraging that can benefit organizational learning and culture (Akter *et al.*, 2016; Bordeleau *et al.*, 2020) and build up firms' dynamic capabilities (Mikalef *et al.*, 2019; Wamba *et al.*, 2017).

The second stream of this cluster rejects the previously held view of knowledge as an objectified commodity (Gherardi, 2000), and embraces the sociological practice lens that equates knowledge with practice and positions the practitioner and their micro-actions at the heart of knowledge creation (Cetina *et al.*, 2005; Peppard *et al.*, 2014). Researchers adopt the practice theory to explore the human interactions that involve the tacit and dynamic process of knowledge creation occurring at the intersection of the social and the physical (Cook and Brown, 1999; Shollo and Galliers, 2015). In this vein, BI becomes an active facilitator of the participatory process of organizational knowing that comprises sense-making, knowledge creation and decision-making (Choo, 2002; Shollo and Galliers, 2015). In parallel, knowing emanates from the participant's experiences, interactions, actions and

contestations (Kolb and Kolb, 2005; Shollo and Galliers, 2015) and evolves and transforms as participants engage in the practice of knowing (Orlikowski, 2002).

Evolution of business intelligence research

Early references of intelligence as an activity to gain knowledge about the environment are omnipresent in the ES cluster where reside the roots of BI. Scholars in this cluster adopt an outside-in perspective that pictures firms as biological organisms whose actions are often constrained by their external environments (Brownlie, 1994). This implies that organizations should constantly monitor their respective environments to ensure the detection of plausible alterations susceptible to jeopardizing their competitive advantage. This logic fueled a proliferation of studies examining both the corporate practice of ES and the variables influencing its use (Jennings and Lumpkin, 1992). Because most companies scan their respective environments the effective response to threats and opportunities arises as the ultimate challenge (Huber, 1990). Once detected, signals at the periphery of the firm entail a proper evaluation and interpretation. Only then, the ES can serve as a weapon to support managerial action (Fabbe-Costes *et al.*, 2014).

In response, Porter's (1980) influential book framed the analysis arena along five forces and associated competitor analysis to business strategies (Peyrot *et al.*, 1996). Thenceforth, an avalanche of works depicted the competitor behavior instead of the amorphous boundaries of firms' environment (Peyrot *et al.*, 1996). Inspired by competitor analysis and market research, two new streams joined the ES cluster: CI and MI. Under CI, researchers explored corporate CI activities and prescribed intelligence best practices, whereas MI scholars focused on the consumer as a source of data and salespersons as collectors and disseminators of intelligence (Bernhardt, 1994; Le Bon and Merunka, 2006; Fleisher *et al.*, 2008; Mariadoss *et al.*, 2014).

The careful reader shall notice the outside-in focus of the three clusters: ES, CI and MI on the external environment while overlooking data regarding the distinctive competence (Selznick, 1957) of the focal firm. Following this rationale, scholars studied the influence of environmental factors on the scanning activity such as uncertainty (Hubert and Daft, 1987), complexity (Child, 1972), rate of change (Daft *et al.*, 1988), importance (Aaker, 1983; Pfeffer and Salancik, 1978), culture (Leidner *et al.*, 1999) and competitive pressures (Zhu and Kraemer, 2005). Other widespread examples are the share of wallet (Zeithaml, 1988), customer perceived value (Hughes *et al.*, 2013), product development (Lynn, 1998), superior sales growth (Slater and Narver, 2000) and market orientation (Narver and Slater, 1990).

Traditionally, the collection of intelligence was formal or informal through open and human sources. However, with the internet, the intelligence gathering activity faced the challenge of information overload (Chen *et al.*, 2002). This new reality called for a more tailored information allocation system capable of gaining external and internal data (Christen *et al.*, 2009) and signaled the swing of BI research pendulum from an outside-in intelligence collection to an inside-out sophisticated analysis run by computerized DSS that prepare the requested intelligence for executives (Leidner and Elam, 1993). Such decision aids stimulated the design of EIS to retrieve the information related to internal operations and the business environment (Turban and Schaeffer, 1987) and gave birth to the DSS cluster that grew beyond data warehouses (Sen and Sinha, 2005) to encompass the organizational decision-making process (Turban *et al.*, 2010).

Nothing captures this stream's orientation better than the organizational factors its scholars shed light upon managerial heterogeneity (Cho, 2006), experience (Thomas *et al.*, 1991), managerial attitude (Qiu, 2008), absorptive capacity (Elbashir *et al.*, 2011), problem identification speed (Leidner and Elam, 1995) and extent of analysis (Miller and Friesen, 1980).

This stream represented the traditional school of information systems (IS) that focuses on the macro-level of organizations and views knowledge as a transferable commodity from the sender to the receiver (Gherardi, 2000; Shollo and Galliers, 2015). Such a simplistic definition of the concept of knowledge combined with the outright overlooking of the human element in knowledge creation, particularly underscored by processes such as sensemaking (Weick, 1979), beget the second pendulum swing of the BI research toward practice theory and sociology generating what we dub the AP scholarly stream. In short, the AP is nascent prescriptive research that attempts to remodel the IS research following the practice theory, knowledge-based view and dynamic capabilities. Scholars tilted their attention toward the micro-level of organizations and introduced concepts enjoy strategizing in IS (Shollo and Galliers, 2015), IS strategy as practice (SAP) (Peppard *et al.*, 2014), organizational knowing (Choo, 2002; Shollo and Galliers, 2015) and BI capability (Akter *et al.*, 2016; Bordeleau *et al.*, 2020; Côrte-Real *et al.*, 2017).

Finally, the technologies that the data warehouse deploys to execute queries across a wide range of data (e.g. extract–transform–load, relational database management system, online analytic processing server) (Chaudhuri *et al.*, 2011) attracted scholars' interest in their upgrading and prototyping. This theme makes up the AT cluster that seems to have held sway over the rest of clusters thanks to its heavy technological penchant that seeks to produce turnkey solutions for industries.

In sum, the particularity of BI literature rooted in two scientific communities yielded disjointed research. Hence, the lack of a comprehensive view of BI because of ontological and epistemological discrepancies between the management and informatics communities that weave the strands of BI research. Unfortunately, while still at an early stage, the BI research cut its umbilical cord with the business community in the late 2000s. Nothing mirrors such a state better than the plummeting contributions of the business community that led the field at the outset of the 2000s. A significant share of contributions belongs to the informatics community with a dominant AT research and publications from both the DS cluster and the AC stream. Figure 2 exhibits this state of affairs by assigning the 120 articles to the six research clusters of BI research from 1985 to 2020.

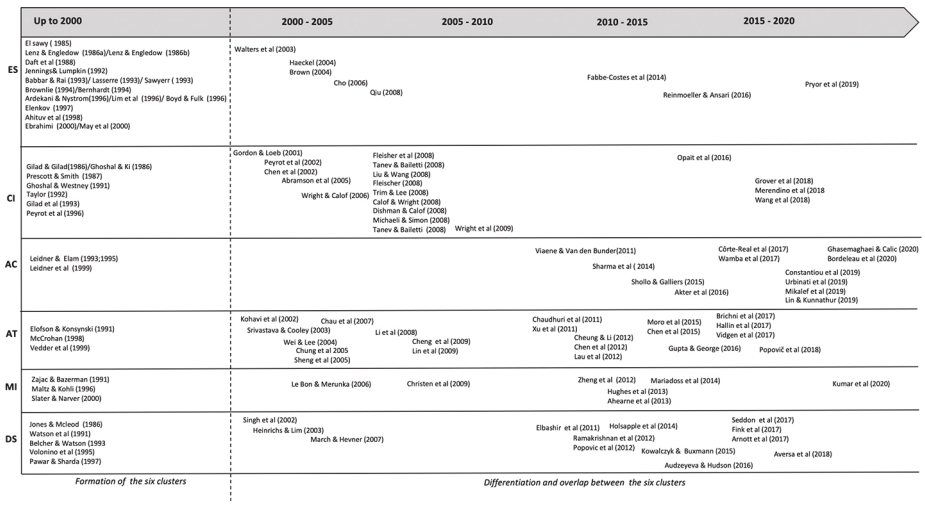

Figure 2.
Evolution of BI literature

Future research agenda

Although theoretical pluralism has enriched the BI domain, the business and informatics communities failed to reach a common scientific epistemology and engulfed the research into two diverged views of BI. Research stemming from the informatics community has been concerned with developing the ultimate BI software capable of generating reliable intelligence. This yielded technologies are responsible for converting mostly unstructured data into a homogenous piece of knowledge. Conversely, business scholars revealed a particular interest in the structure of any firm's industry as a prerequisite to formulating viable strategies. Their outside-in perspective to make sense of the environment uncertainty generated a nearsighted batch of works where the external environment and operational effectiveness are visible, whereas the distinctive competence and capabilities of organizational actors appear blurry. As a result, one can best capture the BI literature under the tree metaphor with its roots in the business community, and its leaves in the informatics research. Similar to its pluralistic theoretical landscape, BI research draws from overlapping views of BI as illustrated in Table 1. We, therefore, pinpoint the need for conceptual unification should scholars bridge their fragmented community. In this vein, we suggest a comprehensive umbrella term where BI is synonymous with a computerized system that runs a gamut of technologies to perform an iterative and recursive process. This latter comprises four phases: the collection of outer and inner data, the transformation of data to actionable intelligence, the impartment of knowledge to business users and the monitoring of organizational exploitation and absorption of knowledge. In what follows we offer research suggestions that shall shed light on the research gaps of each cluster as Table 1 illustrates.

Environmental scanning cluster

Most research stemming from this cluster investigated the relationship between strategic uncertainty and the scanning behavior of executives in western countries. However, we still need more comparative studies to verify whether the positive correlation found in western environments are also valid in non-western environments, transitional economies, and highly institutionalized contexts (Ebrahimi, 2000; Elenkov, 1997). For this, studies shall alter to a more dynamic view of the environment, wherein we need a framework capable of capturing today's business environment. Further improvement of ES theory can also emanate from grounded theory to decompose the scanning behavior construct, and decipher its relationship with perceived strategic uncertainty in dynamic environments through processual studies to capture any refinement or degradation in the scanning behavior of executives (Boyd and Fulk, 1996; May *et al.*, 2000). In so doing, the research could explore the potential existence of nonlinear correlations between scanning behavior, managerial cognition and strategic decision-making (Qiu, 2008). The ES cluster should adopt an inside-out perspective to verify the results indicating an influence of organizational strategy, structure and processes on the scanning behavior of executives (Weick, 1979; Hambrick, 1981; Hrebiniak and Joyce, 1985; Hodgkinson and Johnson, 1994; May *et al.*, 2000). Further research should also be directed toward the outcomes of ES in benign and dynamic environments and verify its influence on strategy work, strategic orientation, competitive advantage (Ebrahimi, 2000; May *et al.*, 2000) and strategic decision making in both western and non-western contexts (May *et al.*, 2000).

Competitive intelligence cluster

Since its inception, the CI research focused on the external environment and turned out descriptive and exploratory publications of CI practices in western environments

Table 1.
Research agenda for the clusters of the BI research

Clusters	Stand on BI	Main theories and heuristics	Methodological shortcomings	Research gaps
ES	The collection of external data	SCP paradigm; organization behavior theory	Lack of surveys of western executives Lack of cross-case studies Lack of cross-functional studies Lack of cross-country studies Lack of conceptual studies Lack of literature reviews Lack of ethnographies and explanatory studies Lack of mixed methods	The impact of institutional pressure on scanning The role of cross-functional scanning behavior The relationship between scanning and organizational culture The relationship between institutional isomorphism and ES
CI	A product of actionable intelligence A four-phase process (planning, collection, analysis and communication)	Porter's five forces; SWOT analysis; market research; CRM	Lack of surveys of western executives Lack of cross-case studies Lack of cross-functional studies Lack of conceptual studies Lack of ethnographies and explanatory studies Lack of mix methods	The revision of the CI cycle to account for intelligence exploitation The relationship between the CI cycle and absorptive capacity The relationship between CI and organizational structure and strategic decision making The issue of scope and focus in the CI cycle The integration between CI and MI
AT	A set of technologies that transforms data into actionable intelligence	Functional linguistic theory; sentiment analysis; analytic hierarchy process	Lack of qualitative studies Lack of ethnographies Lack of action research Lack of applications	The relationship between BI and strategy work The role of BI applications in enabling strategic agility The impact of BI technologies on behavior change of organizations and business users The degree of dependence between competitive advantage and BI as a resource and investment

(*continued*)

Clusters	Stand on BI	Main theories and heuristics	Methodological shortcomings	Research gaps
DS	An interface where executives can retrieve data and perform queries A system that prepares data for the business user	Contingency theory; systems theory; Chandler's "structure follows strategy"; Simon's model of decision making; organizational ecology; transaction cost economics.	Lack of consolidative literature reviews Lack of cross-disciplinary conceptual studies Lack of ethnographies and sociological approaches Lack of longitudinal case studies	The relationship between DSS, EIS and social exchanges in strategy work The relationship between routinization of strategy processes and DSS/EIS The role of organizations' readiness for DSS/EIS and the success of their adoption in strategy work The relationship between organizational infrastructure, inertia and the implementation of DSS/EIS in strategy work
MI	The gathering of customers and competitors' data	Nielsen and Dirichlet market measures; social exchange theory; cognitive selling paradigm; expectancy theory	Lack of qualitative case studies Lack of cross-functional and cross-country studies Lack of conceptual studies Lack of ethnographies	The influence of individual constructs like credibility and job involvement of boundary spanners' on their behavior toward intelligence collection and dissemination Determinants of the quality of boundary spanners' intelligence activities The relationship between intelligence implementation, credibility and persuasiveness of the sender The relationship between intelligence adoption and structure holes and social network in the case of the formal and informal intelligence unit

(*continued*)

Table 1.

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Table 1.

Clusters	Stand on BI	Main theories and heuristics	Methodological shortcomings	Research gaps
AC	A facilitator of the participatory process of knowledge creation	Practice theory; Organizational learning theory; knowledge-based view	Lack of quantitative studies Lack of literature reviews Lack of ethnographies Lack of explanatory studies Lack of cross-functional studies Lack of mix-methods	The impact of the intelligence activity on organizational knowing The impact of intelligence practices on existing organizational practices The influence of the intelligence activity on sensemaking The impact of the intelligence activity on the strategy process

(Fleisher *et al.*, 2008; Wright and Calof, 2006; Wright *et al.*, 2009). This logic failed to operationalize the CI cycle and produce measures to evaluate its performance (Wright and Calof, 2006). Therefore, research should tap into the resource-based view to position the CI function within the organization, conceptualize its formalization and integrate its cycle with organizations' strategic processes and management systems (Dishman and Calof, 2008; Fleisher *et al.*, 2008). Further studies should also investigate the scope of the CI function, frame the needed practices and decompose its activities into constructs that both managers and scholars could identify, measure and evaluate (Wright and Calof, 2006). Research should attenuate its prescriptive pattern, and conduct more case studies that illustrate the actual practice of CI in various contexts, and explain the strengths and shortcomings of informal and formal CI units concerning the CI best practice model and their value to strategy work and firms' performance (Wright and Calof, 2006; Wright *et al.*, 2009). Finally, further work investigating the competence of CI agents and the comprehensiveness of the CI process (planning, collection, analysis and communication) is undoubtedly instructive. For instance, we know little about the role of CI officers in propagating the intelligence culture inside organizations, not to mention the need to explore how the CI cycle permeates and nurtures this culture (Trim and Lee, 2008). Scholars should turn their attention to the breadth of the CI cycle that fails to follow the disseminated intelligence and account for its exploitation and absorption throughout the organization (Trim and Lee, 2008).

Market intelligence cluster

Extant research in this cluster adopted a quantitative approach and focused heavily on salespersons' behavior toward the participation in collecting and communicating MI (Le Bon and Merunka, 2006; Ahearne *et al.*, 2013) Research examining the quality of salespersons and other boundary spanners is, nonetheless, absent (Le Bon and Merunka, 2006). Likewise, research examining managers' perception of boundary spanners' intelligence efforts is lacking (Le Bon and Merunka, 2006). With that said, scholars can turn to social judgment theory to explore the issue of legitimacy and persuasiveness between the intelligence sender and the receiver and explore organizational citizenship behaviors to investigate the role of job involvement, recognition and motivation vis-à-vis the intelligence efforts of boundary spanners (Le Bon and Merunka, 2006). Additionally, future work can look at the antecedents of intelligence quality stemming from boundary spanners and the impact of their social capital on the collection of high-quality intelligence (Le Bon and Merunka, 2006; Hughes *et al.*, 2013). More research examining the boundary spanners' intelligence collection networks (informal vs formal) and its relationship with firm performance is needed (Ahearne *et al.*, 2013). Besides, future research should account for the difference between tacit and articulated knowledge and address how each type supplements strategy work and feeds the intelligence culture and organizational learning (Ahearne *et al.*, 2013). Finally, further research needs to view the intelligence activity as a resource and capability for achieving competitive advantage (Kohli and Jaworski, 1990; Narver and Slater, 1990; Day, 1994; Hughes *et al.*, 2013) to investigate the intelligence collection and dissemination in relation to strategic decision-making, strategy formulation and implementation (Hughes *et al.*, 2013).

Decision support cluster

This literature strives to explore the impact of DSS on organizational learning and executive decision-making (Elbashir *et al.*, 2011; Kowalczyk and Buxmann, 2015). The research herein commenced with the concept of DSS, transitioned to EIS and shifted to BI. Unfortunately, middle- and front-line managers and various business users seem discarded by this cluster's line of thinking and therefore call for scholars' attention. Similarly, further research should

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adopt both macro- and micro-perspectives following structuration theory and social exchange theory in tackling the relationship between the social structure of organizations and agents' social exchanges and BI. This suggestion finds validity in research suggesting that successful technology innovation and management system implementation is bottom-up rather than top-down and results from developing a suitable organizational capability (Elbashir *et al.*, 2011). Similarly, understanding the impact of ambidexterity and inertia on BI and their derived tensions influencing BI success also represents interesting research directions. This avenue finds motivation in previous results that place institutional isomorphism and inertia as an independent variable for BI implementation (Ramakrishnan *et al.*, 2012; Audzeyeva and Hudson, 2015) and suggest a positive correlation between high degrees of ambidexterity and astute decision-making (Kowalczyk and Buxmann, 2015). Finally, the linkage between organizational structure and BI still arises as an underexplored area and requires researchers to investigate which structure represents an environment ripe for effective intelligence use: organic or mechanistic structure. However, the causality chain of this linkage is still unclear and deserves further exploration similar to the causation link between strategic orientation (cost leaderships/differentiator) and BI.

Analytical technologies cluster

Despite its dominance over the BI scholarly community, this research stream discards any cross-disciplinary agenda with the other clusters, let alone the positioning of BI in the strategy work. Research in this cluster is *ad hoc* and highly technical centered on BI as a computerized system rather than its outcomes or the needs of business users (Brichni *et al.*, 2017; Chau *et al.*, 2007; Chen *et al.*, 2002; Chung *et al.*, 2005; Lau *et al.*, 2012; Moro *et al.*, 2015; Opait *et al.*, 2016). Scholars, therefore, should direct their attention to the role BI could play in strategic decision-making and investigate the residual value of BI for organizational learning across various industries. Similarly, this new research could draw from the resource dependence theory to explore the impact of BI technologies as a resource on the change of behavior across the organization and business users. In this vein, longitudinal studies enable scholars to tap into the behavior changes prior and after investing in BI technologies (Thomas *et al.*, 1991) and track managers' intelligence use as they assume high-level positions (Jones and McLeod, 1986). Moreover, today's dynamic environment encourages scholars to examine the relationship between BI and strategic agility of organizations and executives' decision-making. In this regard, scholars can import the notion of dynamic capabilities to understand better the ability of BI to provide decision-makers with actionable knowledge upon which they can act swiftly in dealing with the versatility of environment.

Analytical capabilities cluster

This nascent research stream draws from practice theory and actor network theory and aspires to emulate the SAP research in analyzing the micro-role of BI in organziational learning processes and dynamic capabilities (Côrte-Real *et al.*, 2017; Mikalef *et al.*, 2019) and within the microprocesses of organization strategy work by top management teams and middle managers (Peppard *et al.*, 2014; Shollo and Galliers, 2015). While this research investigates the influence of BI on the practices conducive to knowing (Shollo and Galliers, 2015), it seems about time to highlight its need to explore the issue of the socio-materiality of BI and examine how it entangles with social practices in strategy work. Following the SAP tradition that pictures strategy work as dependent upon an ongoing sense-making activity between managers and subordinates to decipher meaning out of paradoxical problem definitions or solutions, the AC cluster can tap into the role of BI in shaping the interactions

and interpretations of reality. This tradition of interactionism draws from sociology and behooves turning attention to all participants in the social activity of strategy work (Blumer, 2012) where sensemaking is subject to multiple interest groups that might encounter rivalry, opposition, or confrontational framing contests, in which contestants establish control over reality interpretation (Entman, 2003). In this vein, AC scholars should address the role of BI in relation to these confrontations and the manner whereby it influences frames contestation and sense-making.

Conclusion

The BI research is far from the exhaust. Its growth into fragmented research has witnessed two periods of ferment following two pendulum swings that advanced the research toward theoretical pluralism. While this state of affairs contributed to the enrichment of our knowledge of BI, it plunged the field into overlapping research endeavors that hampers the field's advancement toward maturity. Therefore, our paper attempts to build consensus across the BI scientific landscape and pinpoints where research gaps still await attention. We highlight the theoretical underpinnings of BI research and underscore the shared commonality among BI scholars despite their different research clusters. This article, therefore, contributes to the extant literature by:

- decomposing the BI scientific landscape to six research streams;
- diagnosing the theoretical underpinnings of each research cluster;
- mapping the evolution of BI scholarly community; and
- suggesting a new agenda for future research.

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Appendix

TITLE-ABS-KEY ("business intelligence" OR "business intelligence model*" OR "competitive intelligence" OR "market intelligence" OR "executive information system*" OR "decision support system*" OR "business analytic*" OR "data mining" OR "data*warehous*" OR "online*analytic*processing" OR "extract*transform*load" OR "environment* scanning" OR "customer intelligence" OR "environment* analy*i*" OR "financ* intelligence" OR "structured query language" OR "relational database management system*" OR "data mart" OR "data discovery" OR "dashboard" OR "process mining" OR "complex event processing" OR "Prescriptive analytics" OR "Predictive analytic*" OR "big data" OR "big data analytic*")

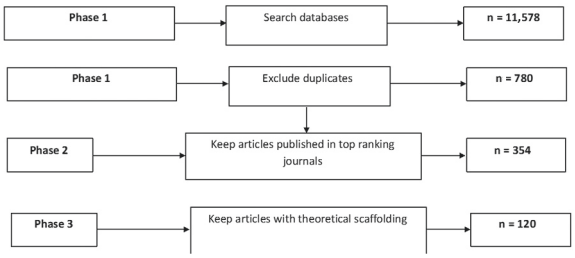

Figure A1.
Search process of articles

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A deconstructive re-reading of the "big data analytics/strategizing" relationship

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Abstract

Big data analytics as a central concept in strategizing is gaining unequivocal consensus. However, the research interest in its mediative role and usage has overshadowed its ontology and relationship with the social practice of strategizing. In this paper, we attempt a critical study of this relationship -drawing on Latent Dirichlet Allocation (LDA) and Derrida's deconstruction- and seek to unveil the taken-for-granted assumptions and inherent contradictions of this binary relationship rooted in the 'material/social' distinction. We argue that the 'big data analytics-strategizing' couplet is subject to two faits accomplis: 'instrumentality' and 'compliance' that juggle the flow of causality and agency between the two sides of the dualistic liaison. The 'big data analytics-strategizing' relationship is not so much about 'mediative resources' or 'artifacts-in-use' as much as it is about the 'ordering' of social condition into shape or its 'free will' to resist big data analytics. When viewed thus, this relationship takes on a very different turn, which brings forth the relentless contestations between instrumentality and resistance, finality and enactment, change and inertia, linearity and emergence. Such ontological opposites nurture and uphold our alternative re-reading of the premise of the 'big data analytics-strategizing' relationship.

Keywords: big data analytics, strategizing, strategy as practice, materiality, deconstruction.

Introduction

Practice theory holds the site of social life as a nexus of human practices and material arrangements (Schatzki, 2005), and therefore sets aside the 'human/material' separatism in favor of their ontological entanglement (Orlikowski, 2015). As a result, materiality is paramount to the strategy-as-practice (SAP) research because material affordances provide strategy workers with the ability to strategize in novel ways that they could not have known or done before (Leonardi & Barley, 2008). In the SAP literature, the material-social relationship is central to our normative understanding of who is a strategist and what is strategizing (Balogun, Jacobs, Jarzabkowski, Mantere, & Vaara, 2014; Callon & Law, 1997; Jarzabkowski, Spee, & Smets, 2013). This is clear in the work of Callon and Law (1997) who stress that the human and material artifacts become entangled in the doings of strategizing activities to the degree that the strategist arise through their embodied interactions with a range of material artefacts that make such an identification possible. In this context, SAP scholars conceptualize strategizing processes and meaning making as materially mediated stream of activities in which strategists accomplish tasks using materials (e.g., Bourgoin & Muniesa, 2016; Dameron, Lê, & LeBaron, 2015; Knight, Paroutis, & Heracleous, 2018; Whittington, 2015). Meanwhile, a plethora of SAP studies (e.g., Buergi, Jacobs, & Roos, 2005; Denis, Langley, & Rouleau, 2006; Jarzabkowski, Giulietti, Oliveira, & Amoo, 2013; Jarzabkowski & Seidl, 2008; Spee & Jarzabkowski, 2009; Spee & Jarzabkowski, 2011; Wright, Paroutis, & Blettner, 2013) focus on the affordances of sociomaterial resources (technologies, tools-in-use, sites, websites, etc) that shape the strategy work being performed and stimulate the actions of organizational members engaged in its doings. These studies show that materiality shape strategizing activities by enabling or constraining practices of agents involved in it and their meaning making (Bakke & Bean, 2006; Garreau, Mouricou, & Grimand, 2015; Jarzabkowski &

Kaplan, 2015). This stream highlight the mediating role of technology in structuring organizational practices, and the massification of strategizing activities (Orlikowski & Scott, 2008; Whittington, 2015; Wright et al., 2013; Zammuto, Griffith, Majchrzak, Dougherty, & Faraj, 2007).

Despite the claimed material turn in SAP (Dameron et al., 2015; Lê & Spee, 2015), the taken-for grantedness of the material, technologies in particular, relegates it to the background as a mediator or usage prop (Orlikowski & Scott, 2008; Zammuto et al., 2007), which cannot leap over the tangential treatment of the 'material/social' relationship. In response, we seek to pursue this ontological project by focusing on how material technologies -Big data analytics in particular- and strategizing come together as a 'genre' that structures the activities of managers and other organizational members (Levina & Orlikowski, 2009; Orlikowski & Yates, 1994; Seidl & Whittington, 2014). With its rising centrality in the practice of strategy, big data analytics not only pushes us to rediscover its status within our strategizing practices (Orlikowski & Scott, 2008; Zammuto et al., 2007), but also prompts the rethinking of the relationship of the human and the material (Bailey, Faraj, Hinds, Krogh, & Leonardi, 2019), and the nature of strategizing (Volberda, Baden-Fuller, Birkinshaw, Khanagha, & Mihalache, 2018) and organizing (Bailey et al., 2019). After all, the 'big data analytics/ strategizing' couplet is, by extent, rooted in the 'material/social' separation, which implies that any contemplating of the relationship of Big data analytics and strategizing calls into question the distincion between the material and the social (Arnold, 2003; Barley, 1998; Leonardi & Barley, 2008). To make our case, our paper has to do with dismantling some more persistent legacies of this distinction by exaimining a variety of cross-disciplinary scholarly works summoned together to make sense of big data analytics and strategizing. Our purpose is neither a bibliometric analysis nor a systematic critical review of the literature, per se, as much as it is an ontological project whereby we aim to flesh out the ontological and

epistemological dichotomies that shape the 'big data analytics-strategizing' relation across 204 articles published between 1995 and 2020. As a basis for our investigation, we rely upon two approaches of analysis. First, we use Latent Dirichlet Allocation (LDA), a machine learning method, to uncover eight topic sets and two primary themes that permeate our sample (Blei, 2012). Second, to surface evidence of dichotomies and opposites that govern the 'big analytics-strategizing' relationship, we pursue a post-structuralist approach -Derrida's deconstruction- to reveal rhetorical devices such as metaphors, contrasts, logical sequences, or marginalization (via quotation marks, underlines, square brackets, or parentheses), which we then interpret in order to surface how the two primary motifs of the 'big data analytics-strategizing' relationship depend on "*…taken-for-granted assumptions that may suppress, distort, marginalize, or exclude certain ways of thinking…*" (Beath & Orlikowski, 1994, p. 351). The paper proceeds with a brief introduction of Derrida's deconstruction, then reports the systematic review process we followed to distill articles. After an overview of Latent Dirichlet Allocation (LDA), the paper lays out our deconstructive re-reading of the literature and concludes with scaffolding the contradictions of the text within epistemological dichotomies that aliment the (material/social) distinction.

Derrida's deconstruction

To define deconstruction would imply stating that deconstruction *is* or *is not* X (Derrida, 1985; Norris, 1987). According to Jacques Derrida, defining is one of the inherent fallacies of western logocentrism that inscribes the assumption that meaning exists within words (Chia, 1994; Derrida, 1985). Therefore, Derrida refuses to confine it to the realm of concept because defining terms as *is* or *is not* is a deliberate endeavor to rebuff the quality of being different 'otherness' ingrained in words whereby they can appear to be what they are (Chia, 1994; Derrida, 1985). Deconstruction holds that each word invokes an utterance or an image 'signifier' and concept that refers to an idea

'signified', and meaning results from this binary structure where the signifier leads to the signified, present in the mind as an image, and itself becomes a signifier of another mental signified in an endless sequence of differences that makes up what a word means, and hence its unstable and indeterminate status that Derrida refers to as 'in play' (Chia, 1994; Derrida, 1993, 1998). Therefore, each time we read or interpret a word in a different context, it takes a different meaning ad infinitum (Chia, 1994). To deconstruct on Derrida's terms is to assume what a word 'signified' means is nothing but another word 'signifier', and therefore the meaning of the signified is dual: one (*di)ffered* to distinguish itself from others, and one put off, i.e., (*de)ferred* until its 'signifier' is present (Chiasson & Davidson, 2012; Derrida, 1972). For instance, the word 'office' in a text or speech is 'signified' and its meaning is (*di)ffered* thanks to its 'supplement' 'home' that distinguishes it from other words, but its meaning is not present, i.e., (*def)erred* because it requires us to address ourselves to other single distinct elements such as 'room', 'place', 'workplace', 'workroom', 'studio', 'headquarter', 'bureau', 'department'. By invoking these words, what the word 'office' means is still absent because it would also require us to appeal to other words whose meaning is set asi*de* in a constant 'play' between 'signified' and 'signifier' that Derrida refers to with the French word: *différance* (Derrida, 1972). Derrida's *diffférance* breaks with the metaphysics of presence of logocentrism and extends meaning to 'differential marks' in time and space (Derrida, 1995), and therefore the text is no more confined to its written body (Derrida, 1995; Rasche, 2011), but supersedes it to the context that makes meaning prevail (Derrida, 1979; 1989).

Deconstruction holds that the origin of something is independent of what comes after it, that is any word in a text or a speech is not part of a 'co-existence' that holds it to other words, but a hierarchy that *differs* its presiding interpretation from other words via its 'supplement', and where the

meanings of both the word and its 'supplement' are *held up* (Chiasson & Davidson, 2012; Cooper, 1989; Derrida, 2002; Rasche, 2011; Deutscher, 2005). Therefore, to deconstruct is to 'over-turn' this hierarchy to emancipate the text from any settled or final meaning, and break any dominant interpretations that holds meaning hostage because on deconstruction terms meaning is always 'free' and 'open' to other interpretations (Chiasson & Davidson, 2012; Cooper, 1989; Derrida, 2002; Rasche, 2011). For instance, previous organization theorists deconstruct oppositions in Management and Organization Studies (MOS) and disclose how 'decision' governs 'action' (Chia, 1994), 'rule' controls 'application' (Rasche, 2007), and 'structure' dominates 'agency' (Knights, 1997) by taking apart the hierarchy that governs opposites in some selected acclaimed scholarly work in organization studies and accepting the logic of '*supplementarity*' that link opposites, rather than the logocentrism of presence that denotes that the 'original' is what is present, and whose meaning is stable and fixed without the absent other that refers to it (Derrida, 2002; Rasche, 2011). This absent other is Derrida's '*supplement*', it is the derivative, the secondary, or the muted pole of the opposition that when disclosed, the '*differed*' meaning of the dominant pole emerges (Derrida, 1998; Rasche, 2011).

Deconstruction is, thus, about questioning the taken-for-granted assumptions of western thinking and its categories of opposite notions where one end is the 'original' and the other one is its 'derivative' (Rasche, 2011). This is not to be mistaken with the inversion of the opposites (Dupuy & Varela, 1992), which would lead to the same hierarchy deconstruction sets to dismantle (Rasche, 2011), but it is to reject thinking in terms of presence of an 'original' and think instead on the grounds of '*différance*' that (differ)entiate what a sign means compared to other signs surrounding it in space via that which is absent '*supplement*' and puts it off '*defer*' to a future time that is yet to come (Derrida, 1972; Rasche, 2011). Deconstruction, thus, peels off the particular content of a

body of text (Beath & Orlikowski, 1994), and seeks to reduce the ensemble to its constituent elements to expose and subvert its hidden suppositions, equivocations, and incongruities (Beath & Orlikowski, 1994; Cooper, 1989; Norris, 1991). Deconstructing a document is an attempt to surface its dependence on taken-for-granted assumptions that forge its narrative and world view or thinking, be it what it discards, accentuates, suppresses or misrepresent (Beath & Orlikowski, 1994; Kilduff, 1993). When we subject a text to to deconstruction, the re-reading transcends the textual unity and content to reveal how contextual conditions govern that which is absent or distorted in the text (Beath & Orlikowski, 1994).

Therefore, we opted for deconstruction as an analytical lens for it breaks free from assessing the authors as a unit of analysis to challenging the text as the only subject of analysis that matters (Beath & Orlikowski, 1994), as though nothing beyond it exists. Deconstruction decenters everything, including authors, beyond the text as this latter's implicit meaning takes center stage (Beath & Orlikowski, 1994). Nothing other than the reading and interpretation of the text matters (Beath & Orlikowski, 1994), as Derrida sees the text and its authors as two separate entities, which keeps the meaning in play between multiple readings and interpretations. In this vein, Derrida's deconstruction dismantles the hidden biases of the text to uncover its implicit meaning to a 'sharp eye' that sees inconsistencies and antinomies (Cooper, 1989; Norris, 1991). It is thus an approach that has no interest in mapping authors' intent as much as it seeks to expose what they wrote as 'preferred readings' (Beath & Orlikowski, 1994; Culler, 1983; Norris, 1991; Watson & Wood-Harper, 1996). For instance, an article that locates its method or research design in a particular theory suggests that this theory or its underlying research paradigm is its 'preferred reading'. Deconstruction considers that the text itself represent a 'preferred reading' to what authors have written, and therefore it begins by identifying its particular themes not as an end but a means to

surface ‘the points of rupture’ where the text’s constitutive elements ‘undo’ themselves or fall apart only to pinpoint other ‘non-preferred readings’ to question what is familiar ‘explicit meaning’ (Beath & Orlikowski, 1994; Watson & Wood-Harper, 1996; Willmott, 1994). In fact, even our deconstruction of our sample can be subject to another deconstruction in an ad infinitum series of challenges to the form and content of the text (Beath & Orlikowski, 1994).

Previous applications of deconstruction in OMT studies (e.g., Beath & Orlikowski, 1994; Calás & Smircich, 1991; Chia, 1994; Cooper, 1989; Kilduff, 1993; Martin, 1990; Rasche, 2008; Weitzner, 2007) pursue two different paths of deconstruction: one begins with singling out the hidden assumptions of the text and using it to challenge its contradictions (Norris, 1991) and ambivalences (Cooper, 1989); the other starts with identifying the rhetoric of the text, then scrutinizes it to expose its implicit premise (Beath & Orlikowski, 1994). Two deconstruction applications of special relevance to our paper is that of Beath and Orlikowski (1994) who follow both approaches to scrutinize the IS analyst-user relationships in information engineering method, and Dirsmith et al. (2005) who investigate the themes generated by interviews of the Big five (four) public accounting firms, different from other OMT scholars who probe single texts. Similar to Beath and Orlikowski (1994), we proceed with both ways of deconstruction to deal with the body of text of our sample, and akin to Dirsmith et al., (2005), we subject two motifs, generated by Latent Dirichlet Allocation analysis of the 204 articles to a deconstructive re-reading. Derrida’s deconstruction is adequate for our endeavor because it allows to handle a body of text that results from a cross-disciplinary and dynamic tradition of strategizing with big data analytics (Rasche, 2008; Watson & Wood-Harper, 1996). Further, it is an adequate pursuit to analyze the body of text on the ‘BI analytics-strategizing’ couplet separate from its authors, and focus our reading on the relationship between

the material (BI analytics) and the social (strategizing) to construe the text by challenging its form and content irrespective of its authors (Beath & Orlikowski, 1994).

The study

Systematic review

We begin our analysis by conducting a systematic literature review to identify big data analytics articles that deal with its relationships with strategizing. We opt for a systematic search to give a sense to other researchers of our exclusion and inclusion criteria (Lee, 2009; Tranfield, Denyer, & Smart, 2003), and offer a post-humanist argument of SAP based on a scientific empirical synthesis (Rousseau, Manning, & Denyer, 2008) that carry relevant contribution to the SAP scholarship (Macpherson & Jones, 2010). We begin with collecting the combined search strings that capture the relational couplet 'big data analytics-strategizing' from previous reviews on big data analytics as Figure 1 shows. We seek to encompass the progress of business and analytics and big data analytics in the past two decades by including the term business analytics to account for the analytical component of business intelligence and all its related terms apparent in the 2000s (Chen, Chiang, & Storey, 2012). We include the term big data and big data analytics to account for analytical techniques for large and complex data and the associated terms and technologies for storage, probing and dissemination (Chen et al., 2012). We treat business intelligence, its applications, and big data analytics as a unified term stemming from two related fields (Chen et al., 2012). We mean by big data analytics all the analytics technologies grounded in data mining and prescriptive and descriptive analysis, data warehousing , ETL, OLAP (Chaudhuri, Dayal, & Narasayya, 2011; Chen et al., 2012).

Insert Figure 1 about here

The review starts from 1995 to account for what Chen et al. (2012) refers to as business intelligence and applications 1.0 period which witnesses the popularization of the analytical technique of business intelligence and applications, data marts, and relational database management systems (Chen et al., 2012). We follow Simsek et al. (2019)'s recommendation of adopting big data analytics as a comprehensive label that covers data collection, organizing, storage, retrieval, analysis and dissemination involving all kinds of data types and volumes, and ascribe to Lavalle et al. (2011), Chen et al. (2012), McAfee and Brynjolfsson (2012)'s views of big data as an extension to digitization and business intelligence and analytics. Following Mackay and Zundel (2017), we include the concepts 'strateg*' and 'tactic*' rather than practice because scholars often use this latter to refer to both concepts (De Certeau, 1988; Scott, 1998), or as a synonymous for strategy (Johnson, Langley, Melin, & Whittington, 2008). After we discuss and decide for a comprehensive search string of keywords, we undertake a search on Scopus for all publications relevant to all variations of our relational couplet "big data" AND "strateg*". Table 1 summarizes our search process involving compiled search strings across titles, abstracts, and keywords of publications on Scopus database. We include asterisk* and Boolean operator OR to account for all variations of keywords, and Boolean operator AND to consider only the articles that address the relationship between any conceptualization of strategizing and big data analytics. We include all ABS ranked publications and fields to account for all contributions that belong to technological studies and SAP and those that lie at the fringe of both disciplines between 1995 and 2020 (Mackay & Zundel, 2017).

Insert Table 1 about here

Our search process follows two inclusion criteria that emanate from two research questions: How is strategizing and big data analytics depicted as a relational couplet? How does the relationship between strategizing and big data analytics conduce the doings of strategy to emerge ? After we elaborated our search string, we undertake a search on Scopus for all publications that apply to our relational couplet. Although these criteria limit the sample, their imposition was necessary as our search on Scopus returns 11328 hits (Mackay & Zundel, 2017). We seek to include only articles published in the 1582 ABS ranked journals because the ABS journal ranking offers an extensive cross-disciplinary list subject to a documented hybrid verification and iterative ranking process based upon peer reviews, peers' consensus, and citations (Mingers & Willcocks, 2017; Morris, Harvey, & Kelly, 2009), which offers us a credible guide to account for the quality standard necessary for developing a high-quality literature synthesis (Macpherson & Jones, 2010; Rousseau et al., 2008). This criterion returns 2900 articles whose abstracts we read to identify 387 articles where both variants of the relational couplet "big data" AND "strateg*" appear. As we read all introductions, we exclude articles that do not engage with the relationship between big data analytics and strategizing or refer to strategy in passing, if we could substitute their strategy verbiage by any other adverbial utterance to convey importance without jeopardizing the spirit of the article (Orlikowski & Iacono, 2001). This reduce our sample to 190 publications which we read in full and expand to 204 articles after we come across other contributions as we read the articles and check their citations and lists of references (Lee, 2009).

Uncovering Motifs

Having selected our sample, we had to determine the motifs that dominate the textual literature on big data analytics and strategizing created and sustained within a cross-disciplinary community of

researchers. Therefore, we concern ourselves with the peeling off of the language that makes up this literature across time to uncover whether the chosen linguistic verbiage reflects any discernable motifs that motivate this body of knowledge. A task that requires reducing the complexity of the textual corpora of the 204 articles in order to derive the thematic lines that motivate the discussions of the 'BI-strategizing' relationship. Coding the 204 articles manually is a strenuous task rampant with researcher's bias that while it can discern some important passages, it also can overlook hidden patterns. Latent Dirichlet Allocation (LDA) solves this issue for its topic modeling algorithms can generate all motifs that documents contain and estimate the strength each portrays within a document, and therefore reduce researcher's bias and offer a computational decryption of thematic structures within large collections of documents (Blei & Lafferty, 2009; Blei, 2012; Blei et al., 2003; DiMaggio et al., 2013). Akin to a lens or vantage point, topic modeling allows us the clearest view of the thematic structures that make up the corpus of the literature because it offers a sound automated method to process the textual volume of our sample, recognize the variance of meaning across contexts, and unveil the dominant labels of the literature corpus before we impose our interpretations of it (DiMaggio et al., 2013). LDA approaches what topics mean with a focus on relationality between words and topics by delineating their co-occurrence patterns (Blei & Lafferty, 2009; Blei, 2012; Blei et al., 2003; DiMaggio et al., 2013). It discerns semantic relationships and conditions of polysemy across chunks of text and generates their unifying schemata as sets of topics containing word patterns that hang together to varying degrees of strength and frequency that index language pertaining to the dominant motifs (Bail, 2014; Blei, 2012; DiMaggio et al., 2013; Fligstein et al., 2017; Mohr & Bogdanov, 2013). Topic modeling views each document as a sequence of topics that each has a certain word content, so when it calculates the word content of each topic it estimates the topic content of each document.

It understands our sample as 'bags of words' whereof a topic (a) mediates the probability of a word (b) in a document (c) and therefore estimates a group of themes that divide the relationship between words and documents into one between words and topics, and another between topics and documents (Blei & Lafferty, 2007; Fligstein et al., 2017). To do so, LDA relies upon hyperparameter alpha and eta values: the former determines the number of topics; the latter controls how words concentrate in each topic (Fligstein et al., 2017). To identify the sets of topics in our sample, we increase the value of eta to 1, based on Fligstein et al. (2017), to allow for neutral prior distributions and expose the dominant motifs from the topic based on data rather than our assumptions. Following Wallach, Mimno, and McCallum (2009), we use asymmetric prior to automatically learn the asymmetric prior distribution from the data, a setting that gives the best results with LDA (Huang, 2005). By so doing, LDA generates eight topics -where words dispositions correspond to their frequency and importance (Fligstein et al., 2017)- that we collapse into two broader dominant motifs based on their similarities in discussing the 'BI analytics-strategizing' relationship as Table 2 exhibits.

Insert Table 2 about here

Having sorted these motifs, we then proceeded with the analysis of each topic following the analytical strategies recommended by Martin (1990) and Beath and Orlikowski (1994), as Figure 2 illustrates, to discern any turn of phrase intended to produce a rhetorical effect that might embody *différance* or *supplement*.

Insert Figure 2 about here

We inspect the full content of the representative articles (title, abstract, keywords, full text, figures, tables, etc) of each topic to determine the state of occurring of "…*dichotomies, contradictions, disruptions, naturalness claims, silences, marginalized elements, metaphors, and double-entendres*…" (Beath & Orlikowski, 1994, p. 357). In what follows, we treat these topics, considering different bodies of information showing the validity of our 're-reading' of the relationship of 'BI analytics-strategizing'. We focus on the reader's experience with the text and do not inquire or seek to expose the intentions the authors had at the time of writing the articles because on Derrida's terms, each article compiles knowledge that reflects the work of a certain context and many unknown people whose aims and intents are silent (Beath & Orlikowski, 1994; Norris, 1991). Contrary to previous deconstruction applications in OMS, which focus on polished and praised scholarly and literary opuses and therefore expose their distinctive literary or artistic appearance, our sample is a cross-disciplinary one whereof many papers are neither conceptual nor literary. As a corollary, our deconstruction disregards any absence of elegance in writing, sophistication in logical processes, or robustness in evidence (Beath & Orlikowski, 1994). Deconstruction is an endless examination of text and therefore we do not hold our inquiry as the sole deconstruction of the body of knowledge on 'BI analytics-strategizing' relationship, but ours pays particular attention to the relationship between the two elements of the couplet, and therefore other researchers can concentrate on deconstructing other subjects of the sample or continue deconstructing our own text or interpretations (Beath & Orlikowski, 1994).

Analysis

Our aim is to question the self-defining origins of the two motifs that persist throughout the literature (Rasche, 2008). Below we examine each one of these motifs in succession, laying out our interpretation along with textual excerpts that corroborate our re-reading. We quote passages in *italics* from the 204 articles with an APA-format (authors, publication date, page number) and underline pieces where prominence of a point requires emphasis (Beath & Orlikowski, 199). We draw on Heidegger (1962; 1969)'s notion of '*Gestell*' to help us discuss and extend our deconstructive account to conditions and structures in the social context (Kilduff, 1993).

Instrumentality as a fait accompli:

The first motif that characterizes the 'big data analytics-strategizing' relationship is the instrumentality of big data analytics in the strategizing context as a certainty before those taking part in strategizing activities hear about it and therefore leaving them with no choice but to adopt it into their practices as 'a fait accompli' as the text takes a firm confidence in the power of big data analytics to cause the social practice of strategizing. For instance:

> *"…there is little doubt that big data analytics can transform organizations, and the firms that recognize the full extent of their opportunities will seize the most value…"*
>
> *(Davenport, 2014, p. 50)*

> *"…the developments associated with big data challenge many of the canons of standard, prescriptive approaches to management and strategy…"*
>
> *(Constantiou & Kallinikos, 2014, p. 2)*

> *"…[Big data analytics] is changing the way companies are organised and changing the role of "humans" in the marketplace..."*
>
> *(Zaki, 2019, p. 434)*

> *"… the developments associated with big data erode the very ground on which widely diffused models of decision making associated with strategy as prescriptive game rest…"*
>
> *(Constantiou & Kallinikos, 2014, p. 2)*

The text has a recurrent action of alluding to 'inexorable' occurrence or advancement of big data analytics in strategic planning processes, strategy workshops, and individual or group level-decision making. For instance, the first paragraph of each introduction includes a similar statement referring to the instrumentality of big data analytics:

> *"…Big data analytics [is] a new enabler of competitive advantage…"*
>
> *(Wamba et al., 2017, p. 357)*

> *"…BDA is … a game changer enabling improved business efficiency and effectiveness because of its high operational and strategic potential…"*
>
> *(Wamba et al., 2017, p. 357)*

> *"…BI plays a key role in information discovery regarding changes in the environment…"*
>
> *(Audzeyeva & Hudson, 2015, p. 15)*

> *"…Big Data [is] a keystone…to make organizations more agile by sensing opportunities and threats, or by seizing possible chances…"*
>
> *(Elia, Polimeno, Solazzo, & Passiante, 2019, p. 11)*

> *"…Big data is here to stay, and every enterprise will have to accommodate the problematic nature of big data as it decides on a course of action…"*
>
> *(Woerner & Wixom, 2015, p. 60)*

By the same token, we find a supportive rhetoric that reinforces the ability of big data analytics to intrude into strategizing practices and improve their flexibility, speed, and efficiency. For example:

> *"…vendors of high functionality BI systems …promote their systems as beneficial for flexibility and strategic decision-making…"*
>
> *(Peters, Wieder, & Sutton, 2018, p. 9)*

> *"… BDA applications can allow an effective internal and external knowledge management which can help firms to create organizational agility by sensing opportunities and threats, by seizing possible chances, and by adjusting to the technological environment to attain competitive advantage…"*
>
> *(Côrte-Real et al., 2017, p. 385)*

> *"… [big data analytics] supporting organizations to disarticulate value creation sources by adopting Big Data…"*
>
> *(Elia et al., 2019, p. 10)*

The unavoidable agency of big data analytics in changing the mechanics of strategy work conforms to a top-down view of the firm that reduces the complex context of strategizing to a mere attending to the needs of executives while the rest of practitioners arise as a 'silent audience'. This assumption is obvious in attributing the adjective "powerful" to executives to insinuate the authority they have on their subordinates' feelings and thoughts. Consider the following statement:

> *"… top executives—a group of powerful, talented, and driven individuals who direct, yet also depend on, subordinates to implement their decisions…"*
>
> *(Pryor, Holmes, Webb, & Liguori, 2019, p. 1978)*

Another clue is apparent in describing the process whereby executives influence their context as a "black box" to suggest the intangible psychological factors that govern their behavior, their understanding of their firms' environments. The text adheres to this wording:

> *"…open the black box [that is how] top executive characteristics … shape firms' efforts to gather information about their environments…"*
>
> *(Pryor et al., 2019, p. 1979)*

Further, in the design of big data analytics that meet executives' needs, the text reads:

> *"…Business analytics can transform data into a more valuable strategic resource which is more difficult to imitate when data is combined with insights and intelligence…"*
>
> *(Kunc & O'Brien, 2019, p. 10)*

And that the instrumentality of big data analytics is beneficial because:

> *"…[it] provides relevant output to… [executives]…for… decisions…"*
>
> *(Constantiou et al., 2019, p. 59)*

> *"…[it] may support … executives to understand better and define the strategic perspective of innovative projects based on the Big Data paradigm…"*
>
> *(Elia et al., 2019, p. 11)*

And that executives:

> *"… should be strategically minded when they start Big Data initiatives and practice [which] means that their Big Data initiatives and practice must be market, or …customer directed, and call for their entrepreneurial spirit…"*
>
> *(Lin & Kunnathur, 2019, p. 57)*

Further, the text subjects executives to the new reality big data analytics imposes as:

> *"…[Executives] need to develop their cognitive capabilities at an individual level; find new ways to make strategic decisions to meet the temporal and other challenges BD brings; and work in new ways, both across the organisation and with external stakeholders who have valuable BD capabilities…"*
>
> *(Merendino et al., 2018, p. 74)*

Notwithstanding this deterministic view regarding the influence of big data analytics in strategizing practices, a scrutiny of the text hints to a different meaning. Instead of devising systems of production for ensuring big data analytics input and social conduction output, we detect that the text's instructions and directions in fact restrain big data analytics from occuring in strategizing practices.

> *Contemplate these contradicting claims:*
>
> *"…BI system provides relevant output to [executives] for … decisions…"*
>
> *(Constantiou et al., 2019, p. 59)*

> *"…Senior managers are prone to use intuitive judgements when these are at odds with quantitative information from the BI system…"*
>
> *(Constantiou et al., 2019, p. 58)*

> *"…In-depth judgemental assessment by [executives] will be required …"*
>
> *(Bhimani, 2015, p. 68)*

The premise of the first statement is that big data analytics intrudes in executives' decisions owing to its relevant output. However, this position seems doctrinal when executives' intuitive judgements trump this very same output. The text roots further evidence of these conflicting

claims in the difficulty to model the contextual acumen that makes up the intricacies of executives' intuitive judgements. The text considers:

> *"…that the intuitive judgments used as input to the decision processes are grounded in contextualized knowledge … [and therefore] it is complicated to anticipate what contextualized knowledge should be included in [BI]…"*
>
> *(Constantiou et al., 2019, p. 59)*

The instrumentality of big data analytics no longer seems to entail a radical shift of the doings of strategizing, but seems to emerge from these very same doings. The text recommends:

> *"… to use Big Data in a logic of discovery first … allowing Big Data to become the opportunity for new theories to emerge and to be tested…"*
>
> *(Elia et al., 2019, p. 11)*

The aforementioned unavoidable occurrence also seems to require "alignment" with the social context of strategizing because the "maturity" of big data analytics is time and context dependent and therefore causes big data analytics to hold a "strategic role". The text notes that:

> *"…BDA needs to have a strategic role in the organization to be able to contribute to performance improvement and …to the creation of business value…"*
>
> *(Côrte-Real, Ruivo, Oliveira, & Popovič, 2019, p. 167)*

> *"…[time] affect[s] the business value of analytics…"*
>
> *(Conboy et al., 2020, p. 9)*

> *"…if matured and aligned to organizational needs, BDA…can increase competitive advantage…"*
>
> *(Côrte-Real, Ruivo, & Oliveira, 2020, p. 12)*

> *"… In order for more efficient deployment of Strategic BI in the whole organization … [it]… needs … to align BI initiatives with corporate strategies…"*
>
> *(Dokhanchi & Nazemi, 2015, p. 103)*

And therefore, for big data analytics to unleash its full agency, its status of a mere executives' decision support "resource" should shift to a capability diffused across organizational layers. Consider this:

> *"… Big Data transcends from a technical artifact to a concept of dynamic organizational capabilities…"*
>
> *(Lin & Kunnathur, 2019, p. 56)*

> *"…Only when Big Data is viewed as a dynamic capability rather than resources, companies can hope to gain and maintain a competitive advantage …"*
>
> *(Lin & Kunnathur, 2019, p. 56)*

> *"… building a BDAC [is] seen as the main barriers in attaining desired outcomes…"*
>
> *(Mikalef, Boura, Lekakos, & Krogstie, 2019, p. 290)*

And once big data analytics turns into a dynamic capability, agility unfolds because:

> *"…The use of [Big data analytics] allows converting knowledge into new routines which will inevitably improve firm agility…"*
>
> *(Côrte-Real et al., 2019, p. 167)*

> *"… agility emerges from…[the] use of BDA…"*
>
> *(Côrte-Real et al., 2019, p. 167)*

However, the text's unwavering obsession with executives' dominance emerges when it considers the plan for aligning big data analytics with strategizing practices. It roots this position of "fit" between the two elements of the 'big data analytics-strategizing' pair in the leadership of executives. For example:

> *"…the BDA … alignment depends on the visionary leadership, which helps to synchronize the BDA capabilities with the business goals…"*
>
> *(Côrte-Real et al., 2019, p. 167)*

> *"… experts believe in a top-down approach …This means …it is crucial to have a BDA strategy and the top management must motivate it…"*
>
> *(Côrte-Real et al., 2019, p. 168)*

These accounts put the social dynamics of strategizing out of the realm of action and assign it a place of passivity, while granting big data analytics instrumentality and executives' leadership a commanding position over action, although the text acknowledges the salience of organizational layers in big data analytics success or failure. For example:

> *"…what is important is not the technologies surrounding big data analytics but the organizational diffusion of such technologies…"*
>
> *(Mikalef et al., 2019, p. 290)*

> *"…organizational aspects …[are] the biggest inhibitors in realizing business value from big data analytics investments…"*
>
> *(Mikalef et al., 2019, p. 290)*

A closer perusal of the guidelines for big data analytics alignment across the social context reveals that data scientists arise as the new "powerful" actors. The recommendation is that organizational barriers emanate because of big data analytics challenging the "status quo power" rather than from social dynamics wherein other strategy participants may find discrepancies between their intended uses of big data analytics and their enactment of new unintended affordances, which might lead to their scepticism toward the enthusiasm spawned by executives over big data analytics. The text notes:

> *"…There is little question that [big data] reconfigures the relationship between an organization and its constituencies…"*
>
> *(Bhimani, 2015, p. 68)*

> *"…The ability to assess big data will redefine lines of authority, influence and organizational power…"*
>
> *(Bhimani, 2015, p. 68)*

In these new power instances, the text puts forward data savvy actors as being most suitable for the doings of strategy with big data analytics because:

> *"…data-savvy people … understand relevant technologies and data-drive business opportunities…"*
>
> *(Grover, Chiang, Liang, & Zhang, 2018, p. 419)*

However, the text records no comments on how such adroitness conceives of existing social structures and routines and whether the new data-culture meets the acceptance and expectations of different social stakeholders. Besides, the text is ambivalent about the "non-data savvy" human

who also takes part in strategizing activities. The text insinuate that they should ramp up their data "adeptness" to maintain their roles:

> *"…Individuals who show adeptness in big data evaluation and draw strategic implications from the data will emerge as particularly influential…"*
>
> *(Bhimani, 2015, p. 68)*

The text alludes to the likelihood of automated processes supplanting human strategists as in the following passage:

> *"… structured adoption of BDACs also has the potential to replace human decision-making, automate processes and resource allocations and lead to radically new ways of doing business…"*
>
> *(Mikalef et al., 2019, p. 290)*

This production system signals covert distinct themes or 'double-entendres' underlying the text. The two active verbs "replace" and "emerge" entail two deviations from the literal sense of ordinary technical jargon to induce a rhetorical or vivid effect in the text, as both verbs are "evolutionary" metaphors. First, "replace" is a metaphor that pictures the non-data savvy human as a substitutable element of the organization that cannot defeat the superiority of automation technologies. Second, the other direction of the metaphor "emerge" entails the survival of the fittest or the Darwinian's natural selection whereby those who are better adapted to their new strategizing context will survive. Both verbs identify with painting the picture of non-data savvy and data-savvy humans as participating in an active, ongoing, and inevitable process of evolutionary survival of the "fittest", which knocks down the overt meaning of organizational alignment that the text lays out.

Compliance as a fait accompli

The text presumes the occuring of big data analytics in the social practice of strategizing is inexorable, which leaves the social condition no alternative to becoming acquiescent and acclimatized to the progressive advancement of big data analytics. The text proceeds with the portrayal of the social condition as a foregone conclusion and draws from the classical 'material/social' dualism to nurture a strict binary relationship of the 'big data analytics-strategizing' couplet following two orthogonal opposites: data scientists vs strategists and deep structure vs new data culture. In what follows, we avail ourselves with Derrida's *Différance* and *supplement* to surface these contrasts.

In the preceding part, we have exposed how the text oppresses the 'non-data savvy' strategists in favor of the 'data-savvy' participants and 'automated' processes. The text is emphatic about reaffirming this dichotomy by causing the reader to think that it is for the 'non-data savvy' to update their skills to match the needs and demands of Big data analytics, when it maintains a silent tone regarding the need to upgrade the features of big data analytics to account for the affordances enacted during strategy work. In this context, the roles that define participation in strategy work will change as analytics experts take over. Contemplate this quote:

> *"…a careful match between the set of users' skills and the needs of a specific BI…"*
>
> *(Audzeyeva & Hudson, 2015, p. 16)*

> *"…the actors …in strategic development processes will change when IT departments, which manage data as a resource, become more active participants …. There will also be more active roles for [analytics] consultants, who specialise in business analytical tools, within the teams supporting the strategic development process..."*
>
> *(Kunc & O'Brien, 2019, p. 10)*

In the meantime, the text notes that failure to reap the benefits of big data analytics could also be for the lack of motivation and unawareness of the 'non-data savvy' referred to this time as 'staff' to denote the 'assistive' nature of their new role and their lack of understanding of the 'nitty-gritty' nature of unstructured data which leads their organizations to become "analytically challenged"

> *"… there were analytics tools that provided significant business value potential, yet staff were unaware, or perhaps not motivated, to use the analytics capabilities for these purposes…"*
>
> *(Conboy et al., 2020, p. 10)*

> *"… analytically challenged firms can get the most out of their analytics by simultaneously leveraging their technology, talent, and information quality to achieve competitive edges…"*
>
> *(Fosso Wamba, Akter, & de Bourmont, 2019, p. 528)*

In contrast, the text confers upon the data-savvy or data scientists the words 'practitioner' or 'actor' to signal their 'active engagement' in the strategizing activities, thanks to their polyvalent skills:

> *"…Such a team should possess a variety of skills, including technical skills in deploying and maintaining BI infrastructure …"*
>
> *(Fink, Yogev, & Even, 2016, p. 53)*

> *"…the team should also be capable of understanding business issues and framing appropriate analytical solutions based on knowledge in the areas of accounting, finance, management, marketing, logistics, and operation management…"*
>
> *(Fink et al., 2016, p. 53)*

> *"… BDA professionals are likely to have significantly different skills, roles, and responsibilities from the ones possessed by regular IT staff…"*
>
> *(Gupta, Sarkar, & Singla, 2014, p. 1061)*

Besides, their 'expertise' also grants them the leadership of these activities and the responsibility to "weave" big data analytics into the 'story' of the organization. Consider the following passages:

> *"…data scientists have the sexiest job of the 21st century…"*
>
> *(Fosso Wamba et al., 2019, p. 527)*

> *"…[Big data analytics] Practitioners should reflect on what they mean by 'analytics' and 'business value', and if in a leadership position they may consider what these terms mean to their staff…"*
>
> *(Conboy et al., 2020, p. 10)*

> *"… 'weave' analytics into the 'story' of …team or organisation, thus ensuring temporal alignment between the… analytics and… the team or organisation's activities…"*
>
> *(Conboy et al., 2020, p. 10)*

Along with this responsibility, their new status demands the authority to oversee, recruit, and deploy talent to achieve the optimal synergy between the practice of strategizing and big data analytics. Therefore:

> *"…the need for the BI owner to hold a strategic position within the organization and have access to adequate resources…"*
>
> *(Audzeyeva & Hudson, 2015, p. 16)*

> *"…the ability of data actors to effectively deploy technology and talent to capture, store, and analyze data toward value creation, business change, and societal change…"*
>
> *(Pappas, Mikalef, Giannakos, Krogstie, & Lekakos, 2018, p. 483)*

However, the text acknowledges the role of interactions in integrating big data analytics across organization layers because:

> *"…the interaction process supports the dynamic alignment between the BI and the organization…"*
>
> *(Audzeyeva & Hudson, 2015, p. 15)*

> *"…multi-dimensional interactions between several stakeholders, with different backgrounds and from different contexts, can improve the relationship between [Big data] provider[s] and user[s] …when creating and capturing value …"*
>
> *(Urbinati, Bogers, Chiesa, & Frattini, 2019, p. 31)*

> *"…the team cannot achieve its organization-wide goals unless its members …communicate …with business and domain experts across the organization…"*
>
> *(Fink et al., 2016, p. 53)*

The text grounds interactions in a sort of pledge of 'leaving no one behind' as a "second route" to constructive deployment. Consider these two statements:

> *"…A strong team of experts is critical to gaining competitive advantage by developing analytical capabilities…"*
>
> *(Fink et al., 2016, p. 53)*

> *"…Once the BI team is formed, it can facilitate the deployment of the BI infrastructure (primary route) …provide information and decision support services to those who fail to effectively use the infrastructure (secondary route)..."*
>
> *(Fink et al., 2016, p. 53)*

This imagery transfers the reader to John William Waterhouse's painting "consulting the oracle" where the 'non-data savvy' strategists seem like the seven women sitting in a ring opposite the standing lady, akin to the data scientist, who gives them an account of the words of the deity or the oracle. This sought-after devotion and attention of 'non-data savvy' strategists to the new practices of big data analytics instill a new explanation for what data scientists do and postpone what non-data savvy strategists actually mean to a later time as what they do and characterizes

their qualities and features is set aside. The text records nothing on the reasons that may privilege the non-data savvy ones in their encounters with big data analytics, which betrays a character of condescending superiority vis-à-vis their role whose meaning is *supplement* to that of data scientists. This unexplained silence regarding their agency is baffling considering that they are the ones, in contrast to data scientists, who concentrate on strategy work activities involving detailed and authoritative knowledge of their doings, routines, structures, and dynamics. The text maintains a *supplementarity* of meaning between data scientists and non-data savvy participants to strip away the social practice of strategizing from its intricacies and relegate non-data savvy participants to a supportive role.

The text calls for interaction and alignment to curb its cautious distrust toward organizational structures captured with the word "deep" to describe an arrangement that is both obliging and rigid against change. The text also invokes the "house" metaphor to refer to this "deep" structure:

> *"…the metaphorical representation of the deep structure as a classical house…"*
>
> *(Audzeyeva & Hudson, 2015, p. 4)*

Sometimes the text seems at odds with its passive narrative vis-à-vis structure and depicts it as a challenge that big data analytics should and can adjust to over time through feedback cycles that seek to decipher assumptions pre- and post-adoption of big data analytics. The text reads:

> *"….BI will need to adjust over time ….to related changes in the deep structure…"*
>
> *(Audzeyeva & Hudson, 2015, p. 15)*

> *"…the establishment of a feedback mechanism between the BI and the deep structure is important for (a) monitoring the robustness of assumptions underlying the organization's*

> *business model and (b) timely signaling when these assumptions no longer reflect the reality…"*
>
> *(Audzeyeva & Hudson, 2015, p. 15)*

Other times, the text hints to the unavoidable confrontation with the deep structure that might engender 'silos' that could hinder the process of maturity of big data analytics. For instance:

> *"… For big data … to yield positive outcomes, it is important that organizational silos are broken down …"*
>
> *(Mikalef et al., 2019, p. 291)*

Besides, the text glosses over the idea of authority and governance to diffuse the analytical culture across the organization:

> *"…governance mechanisms will have a significant impact on the extent to which organizations are 'data-driven'…"*
>
> *(Mikalef et al., 2019, p. 291)*

> *"…Opening up data access and building a culture where strategic insights and innovative ideas emerge from analytics should be within the objectives of … governance practices…"*
>
> *(Mikalef et al., 2019, p. 291)*

Discussion and conclusion

Our deconstructive re-reading of the 'big data analytics-strategizing' relationship, as portrayed in two textual themes of 204 articles, relates to our interpretations -as readers of the text- rather than the intentions of the authors (Beath & Orlikowski, 1994; Kilduff, 1993; Martin, 1990). Through this account, we identify signs and indications of oppositions and ambivalences about the 'big data analytics-strategizing' couplet. Notwithstanding the narrative promoting and encouraging the alignment and integration of big data analytics into strategizing practices and activities, we show how the prescriptions laid down to ensure the "socio-technical fit" and the recommendations for

"shared learning" and "feedback loops" between non-data savvy strategists and data scientists, on the one hand, and analytical culture and deep structure, on the other hand, are inconsistent and contradictory vis-à-vis power distribution across these actors and regarding silent affordances enacted 'in situ' and the degree to which strategizing participants cause the shaping of these affordances and the social dynamics that orchestrate their encounters with big data analytics. The text suggests "diffusion" of big data analytics across all layers of an organization to curb the potential inertia of the "deep" social structure. This advocacy finds rebuttal in its very same roadmaps for tweaking the 'complex' social milieu of the doings of strategizing activities, and the 'training' and 'recruiting' prescriptions put forward to re-construct the modi-operandi of strategizing actors under the technological advancements of big data analytics. The text approaches the 'big data analytics-strategizing' relationship with a presumed dichotomic binary relationship between the material and its underlying novel technological prowess and the strategizing social realm and its obtuse dynamics, which yield a narrative ambiguous in its feelings toward the arrangements of relations between the elements of strategizing as a social practice.

Through the interplay of *différance* and *supplement*, we uncover this incompatible binary relationship in "…*the metaphors, silences, and double-entendres of the text*…" (Beath & Orlikowski, 1994: 372). Regarding *différance,* non-data savvy strategizing practitioners appear 'so yesterday' and 'persona non grata' possessing obsolete skills, expendable 'gut-feelings', and the ability to disturb the course of change, while data scientists are akin to oracles, acting as medium between executives and the complex wilderness of unstructured data, to reflect upon what happened and what is ahead thanks to their impartial analytical judgement and dexterity in writing codes and machine learning algorithms. Encouraging 'diffusion' of big data analytics in the doings of strategy relegates those involved in these activities to the background and brings to fore the

'dialogue' between executives and data scientists who arise as 'trustees that oversee strategy work. This incompatible binary relationship disintegrates over time as part of the coming into-being (Heidegger, 1962) whereby the social elements of strategizing take the 'driver's seat' in manipulating big data analytics and shaping its affordances and by extension its consequences. Assuming without question the social dynamics of strategizing reflects an engrained assumption of the materiality of technology (big data analytics) to cause the social (strategizing) to come into existence and an inherent uncertainty over the power relationships of data scientists and non-data savvy strategists in sharing duties and liabilities over strategizing activities. This opposition grants data scientists the untenable 'driver seat' to challenge the 'deep' structure of strategizing from the investment in big data analytics until this latter reaches maturity, i.e., full diffusion throughout the social dynamics of strategy work, while it pictures non-data savvy strategists as a 'standing reserve' that ought to comply with the new social order and take part in its alignment with existing practices through constant feedback, learning new skills, and redefining their functions.

Our deconstruction notes that this opposition re-inscribes the same inertia it sets out to dissolve by enacting oppositions that foster an atmosphere of disputes and deadlocks where interactivity and collaboration fade away. These oppositions mirror two assumptions of technological determinism. First, the natural order of the world implies the progressive advancement of technology and that any social intervention is therefore against the natural course of nature (Bijker, 1995; Leonardi & Jackson, 2004). Second, it is not the social that acts upon technology but technology's intervention in the social that is certain to happen through causality and agency (Heilbroner, 1967; Leonardi & Jackson, 2004; Marx & Smith, 1994). It is therefore the quality and purpose of technology or its artifacts that determine the socio-cultural order and not the opposite, and that social-cultural change following the course of technological development is certain and inescapable (Heilbroner,

1967; Leonardi & Jackson, 2004; Marx & Smith, 1994). The change of strategizing dynamics is inevitable from a deterministic perspective as the usage of big data analytics alters the strategizing activities and practices of individuals and groups (Leonardi & Jackson, 2004; O'Mahony & Barley, 1999). In this vein, the doings of strategizing submit to the terms of big data analytics as its advent can cause positive and unavoidable changes in the social structures and dynamics of strategizing (Edwards, 1995; Leonardi & Jackson, 2004), which lead executives to believe that altering strategizing practices and modi operandi is a forgone conclusion of big data analytics (Edwards, 1995; Leonardi & Jackson, 2004). This inescapable corollary that technological determinism brings forth gives executives as Jackson et al. (2002) put it 'a narrative' or an 'excuse' to justify or legitimize the altering of the practice of strategizing and restructuring its activities. As a result, the process of causality whereby big data analytics determines the social practice of strategizing is linear and unavoidable -from a known and fixed physical technology whose instrumentality controls its adoption and spreads across society (Arnold, 2003). Big data analytics is akin to a production system of inputs and outputs (of agents, processes, and tools), and that each production system spawns a unique form of strategizing (Leonardi & Barley, 2010; Perrow, 1967). Therefore, big data analytics arises as a rigid, external, and independent element that causes or determines the shape of the social milieu (Orlikowski & Iacono, 2000; Marx & Smith, 1994). The findings of our deconstruction join previous research to challenge this premise and reiterate that the social can act upon technology and shape its development (Bijker, 1995; Bijker, Hughes, & Pinch, 1987; Leonardi & Jackson, 2004; Marx & Smith, 1994). Our deconstructive re-reading questions the linear causality of these deterministic accounts and rhymes with research showing that technology's outcomes are context dependent (Barley, 1998) and are subject to users' norms and interactions (Iacono & Kling, 1999), and that its adoption within a context does not mirror the

intended uses envisioned by its designers (Orlikowski, 1992), but follows social systems and dynamics (Child, 1972; Daft & Lengel, 1986; Noble, 1984; Thomas, 1994; Zuboff, 1988), and therefore to model its outcomes, it suffices to understand the social properties that stimulate the motivation and action of the actors' using of technology (Orlikowski & Iacono, 2000).

Big data analytics is both a material and social artifact and therefore treating it as though deterministic and constructionism are mutually exclusive limits the possibility of complementarity that the two lenses could shed on its functionalities and affordances (Orlikowski & Barley, 2001). Aa a technology, big data analytics submit to the human agency of those (designers, engineers, programmers…) who make it based on their considerations of the laws of physics and their assumptions of its intended usage and the consequences this technology could bring (Bucciarelli, 1994). The agency of those who use it and enact its various affordances as they embed it in their social systems and practices, shape the technology's intended usage and outcomes and yield unintended social settings (Barley, 1986; Orlikowski, 2000; Orlikowski & Barley, 2001). The malleability of the properties and functionalities of the technology render it a subject to the influence of human agency, and yet these very same material attributes can resist human alterations and therefore its rigid design or functionality exerts constraints and influence over human agency (Norman, 1999; Orlikowski & Barley, 2001). The literature on the relationship between big data analytics and strategizing reflects the old but good debate between determinism and voluntarism of all studies at the intersection between the physical and the social (Arnold, 2003; Barley, 1998). At this intersection, there is the dilemma of 'free will' that is the ontology or the nature of causality between the physical and the social, a dilemma between determinism and voluntarism, where the first holds that humans are subjects' 'pawns' of a system of forces that condition their behavior, while the latter grants the human the leadership of their own existence that they model with the

choices they make (Barley, 1998). This predicament is a sign of a literature stuck in a dialogue of the deaf that swings the pendulum of research between the two antinomies of determinism and voluntarism, or an alternation between two conclusions whether we are corollaries or instigators of the social context (Leonardi & Barley, 2010; Maybury-Lewis, 1989). This paradox rooted alternation is not cumulative and yields inconclusive findings, which halts synthesis and further progress beyond contradicting beliefs (Leonardi & Barley, 2010; Maybury-Lewis, 1989). Akin to the Taoism principle that holds that opposites are sine qua non for harmony to happen, Maybury-Lewis (1989)'s idea of integration embraces the paradox of voluntarism and determinism not by resolving their opposing views but by cutting across their boundaries and integrating their divisions (Leonardi & Barley, 2010; Maybury-Lewis, 1989). At the very same intersection between the physical and the social there is also the predicament of materialism vs idealism that concerns the kind of causality between the physical and the social (Barley, 1998).The materialism perspective holds that the human action emanates from the physical milieu, while idealism asserts that human action stems from ideologies and norms (Barley, 1998). Researchers conflate determinism with materialism and voluntarism with idealism, which consecrates the assumption that determinism espouses materialism, and that voluntarism endorses idealism (Barley, 1998). However, the paradoxes of determinism vs voluntarism and materialism vs idealism crosscut one another at varying angles in an 'orthogonal' relationship (Barley, 1998). The physical (big data analytics) does not join the social (strategizing) through a causality chain, but through the power of the physical to 'enframe' our social condition (Arnold, 2003). This 'enframing' analogy draws from Heidegger (1962; 1969)'s notion of '*Gestell*' to refer to the ability of technology at a metaphysical level to operate at the fundamental level that make up our understanding of the world, and change it and 'enframes' our apprehension of the context, along with the experience we have with the

doings, we engage in, with the technology, i.e., what we do with it, we do it on its terms (Arnold, 2003). For instance, a power point slide is not more pertinent or a savvy tool of doing strategy, but it changes what it is to do strategy and visualizes it. Our human agency therefore stands as 'reserve' of resource serving the 'enframed' purpose of technology (Cooper, 2002). The path of our being and becoming in this world is technology and our choice is to accept its constricting 'enframing' of our lives (Cooper, 2002; Feenberg, 1999), or challenge it by uttering both 'yes' and 'no', that is welcoming technology in our lives by leaving it outside of it (Heidegger, 1962; 1969).

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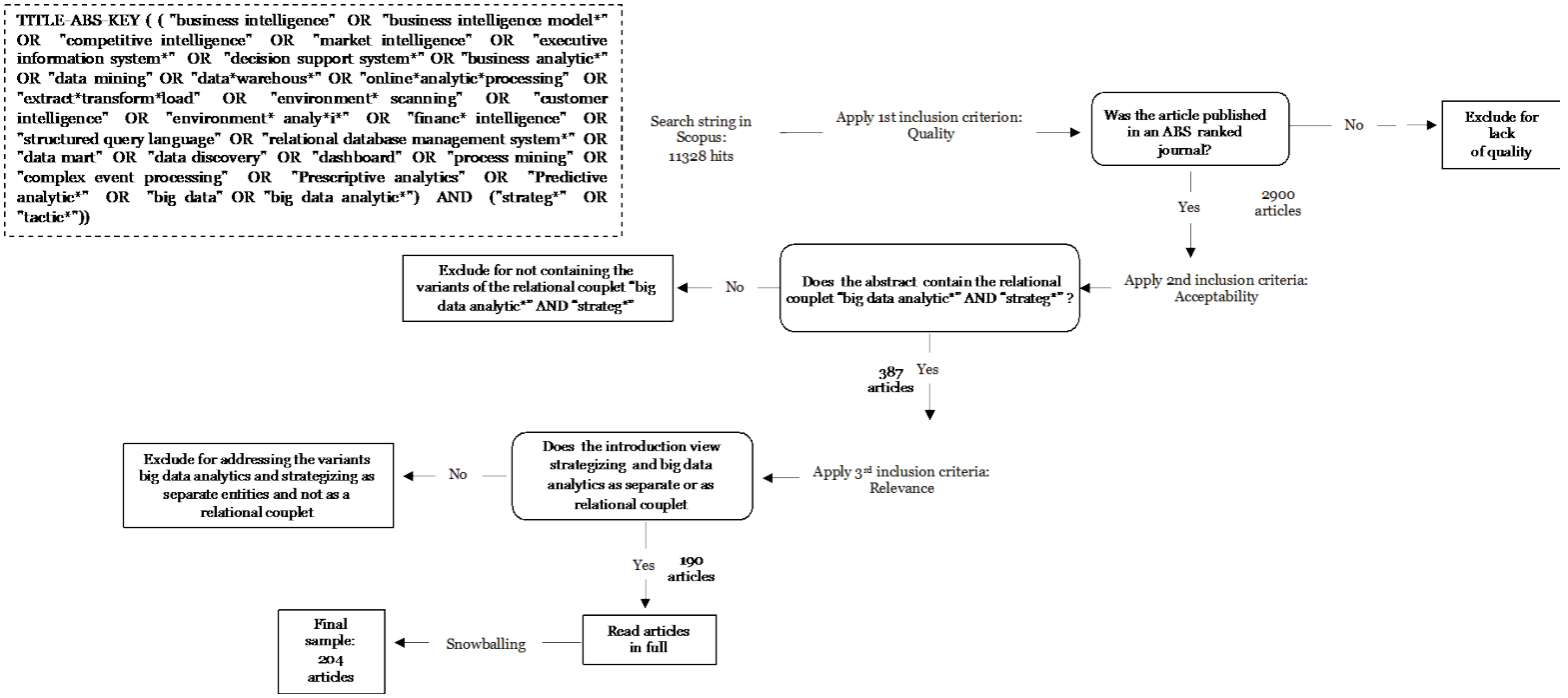

Figure 1. Systematic search process of the literature.

Focus	Authors	Contribution	Data source. Sample. Timeframe
Big data	Roden et al. (2017)	Big data and operations models.	Scopus. 200 articles. Time frame undisclosed.
	Sivarajah et al. (2017)	Big data challenges.	Scopus database. 227 articles. 1996-2015.
	Gupta et al. (2017)	Big data & humanitarian supply chain.	Scopus database. 28 articles. Time frame undisclosed.
	Muller & Jensen (2017)	Big data and value creation.	Scopus and Web of Science. 30 articles. 2010-2015.
	Wamba et al. (2015)	Big data and value creation.	Various databases. 62 articles. 2006-2012
	Mikalef et al. (2017)	Big data and competitive performance.	Various databases.. 84 papers. 2010 to 2017.
	Wang et al. (2016)	Big data and supply chain analytics.	Various databases.. 101 articles. 2004-2014.

Business Intelligence	Sharma et al. (2014)	Business analytics and value.	Undisclosed.
	Trieu (2017)	Business intelligence and value.	Various databases. 106 articles.2000-2015.
	Watson (2009)	BI evolution.	Undisclosed.
	Jourdan (2008)	BI research.	ABI/INFORM database. 167 articles. 1997 to 2006.
	Bose (2009)	BI analytics framework.	Undisclosed.
	Holsapple et al. (2014)	Six dimensions of business analytics.	Undisclosed.
	Harrison et al. (2015)	Internal BI system success.	Undisclosed.
	Bacic & Fadlalla (2016)	Visual IQ-based BIV framework.	Undisclosed.
	Chen et al. (2012)	The evolution of BI & A.	Undisclosed. 3602 articles. 2000-2011.
	Moro et al. (2015)	Business intelligence in banking.	14 journals. 219 articles. 2002-2013.

Competitive intelligence	Calof & Wright (2008)	CI evolution.	ABI-Inform Proquest. 168 articles. 1965 to 2007.
	Du toit (2015)	Evolution CI as an academic field.	ABI inform database. 338 articles. 1994 to 2014.
	Rouach & Santi (2001)	CI scope.	Undisclosed.
Decision support systems	Arnott & Pervan (2014)	DSS research.	16 journals. 1466 articles. 1990 to 2010.
	Arnott & Pervan (2005)	The state of DSS research.	14 journals. 1020 articles. 1990 to 2003.
	Arnott & Pervan (2008)	Eight key issues for DSS field.	1990 to 2004. 1093 articles. 14 journals.
	Hosac et al. (2002)	DSS research.	Undisclosed.
	Mora et al. (2005)	A strategic assessment of intelligent DSS.	Various databases. 398 articles. 1980-2004.
	Khoong (1995)	A new DSS research agenda.	Undisclosed

	Shim et al. (2002)	The DSS decision making process.	Undisclosed
	Eom & Kim (2006)	DSS applications.	Various databases. 210 articles. 1995-2001.
	Tako & Robinson (2012)	DSS modelling tools.	Various databases.127 articles. 1996 to 2006.
	Eom (1996)	6 major areas of DSS intellectual field.	82 journals. 944 articles. 1971-1993.
	Eom (1998)	4 emerging areas of the DSS discipline.	40 journals. 498 articles. 1991-1995.
	Eom (2016)	Four major areas of DSS applications.	ABI/INFORM database. 80 articles. 2002-2012.
	Arnott & Pervan (2012)	5 issues of DSS design science research.	14 journals. 1167 articles. 1990-2005.
Environmnetal scanning	Robinson et al. (2020)	A new typology of 5 ES research.	Various databases.132 articles. 1970 to 2017.

	Okumus (2004)	Ten challenges of ES in hospitality.	31 articles. Undisclosed time frame & sample.
"big data analy*" AND strategizing"	Article at hand	'big data analytics-strategizing' relationship	200 articles. Scopus. All ABS journals. 1995 to 2020

Table 1. Previous reviews on big data analytics and its variants whereof Keywords were imported.

Instrumentality as a fait accompli				Compliance as a fait accompli			
Uncertainty	Simulation	Scenario	Foresight	Value	Integration	Capability	Project
uncertainty	predictor	scenario	foresight	value	integration	big	project
scanning	dynamic	query	knowledge	capability	intelligence	analytic	competency
environment	simulation	tool	industry	performance	group	data	executive
environmental	scenario	strategy	scenario	organizational	organization	capability	director
perceive	map	approach	planning	resource	competitive	practice	team
manager	analytic	method	market	organization	planning	value	environment
executive	development	user	competitor	technology	structure	company	operational
strategy	innovation	group	customer	knowledge	capability	organization	corporate
organization	knowledge	expert	organisation	dynamic	enterprise	analytical	analytical
activity	computer	agent	activity	bda	technology	framework	plan
organizational	framework	application	strategy	bi	competitor	real time	bd

firm	performance	evaluation	organisational	datum	task	technology	datum
performance	industry	framework	network	strategy	tool	application	mining
industry	network	future	company	manager	problem	resource	intuition
market	customer	technique	product	competitive advantage	technique	tool	senior
source	market	problem	development	market	practice	skill	vision
sector	value	design	future	implementation	strategy	warehouse	problem
level	strategy	level	technology	firm	plan	user	resource
company	firm	case	approach	operational	manager	transformation	informant
study	operation	alternative	competition	construct	company	customer	client
external	outcome	set	production	measure	meeting	datum	would
high	increase	different	innovation	factor	organizational	service	bank
scan	product	action	material	level	application	new	could
factor	estimate	number	external	table	activity	create	credit

sample	year	propose	different	quality	communicatio n	insight	relationship
relationship	propose	weak signal	new	item	study	case	say
great	indicator	apply	case	relationship	participant	enable	view
frequency	entrepreneuria l	term	unit	test	marketing	benefit	many
low	company	goal	focus	high	member	source	see
top	could	concept	see	impact	respondent	improve	new
internal	service	step	role	literature	list	build	effort
measure	improve	example	view	effect	identify	drive	success
economic	app	report	service	show	electronic	manage	likely
variable	conduct	consider	way	measurement	large	example	even
task	identify	value	cost	dimension	find	study	service
respondent	design	show	firm	order	facilitator	generate	much
table	sector	represent	lead	survey	type	innovation	failure
find	impact	help	know	customer	improve	help	board
difference	chain	identify	would	success	level	enterprise	manage

test	drive	criterion	example	enable	idea	challenge	level
indicate	capture	target	increase	data	success	healthcare	term
condition	lead	factor	possible	suggest	market	understand	compliance
country	stage	evaluate	well	role	high	well	shift
increase	industrial	individual	take	share	report	way	objective
maker	cluster	weight	value	understand	leader	people	impact
size	table	present	internal	study	key	report	seem
response	critical	paper	exist	view	department	capture	view
hypothesis	number	search	potential	assess	would	product	asset
show	focus	signal	analyse	improve	first	potential	thing
scale	pc	describe	become	response	computer	many	account

Table 2: Top Words for the topics selected.

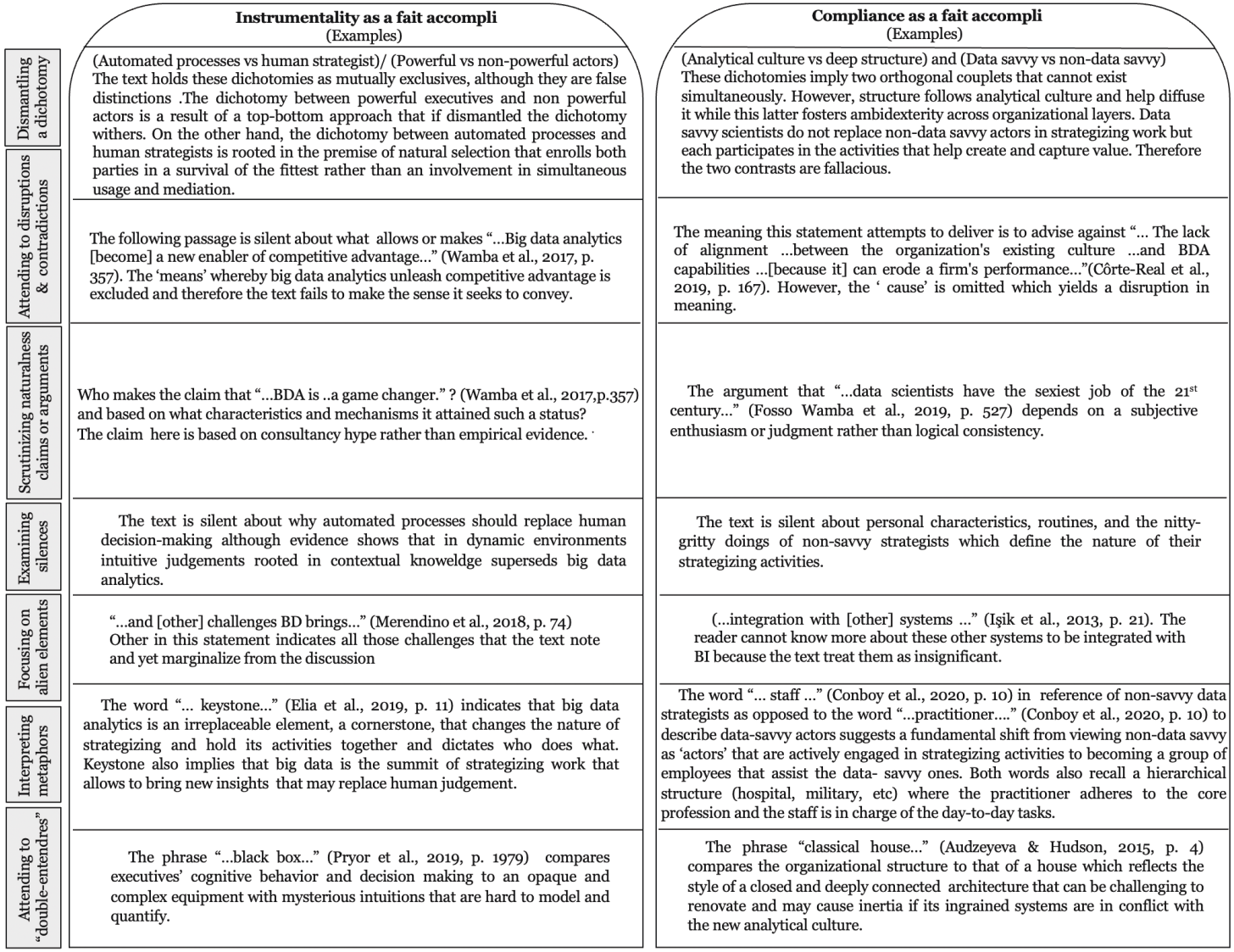

Figure 2: Outline of the deconstruction

13

BI-in-Practice: A Look at How BI Enacts Framing Contests and Affects the Service Transition Path

Yassine Talaoui

13.1 Introduction

Today, the convergence of cloud computing, Web 3.0, social media, video content, Internet of things, industry 4.0, and big data promises a surge in the frequency of change facing the business environment (Heisterber & Verma, 2014). In response to such a shaky context, industrials convert their old manufacturing business models into ones that offer customized solutions to end-users, in an attempt to sustain growth or secure higher margins (Matthyssens & Vandenbempt, 2008; Sawhney, 2006). This transition, dubbed servitization (Vandermerwe & Rada, 1988), is writ large a transformational process conducive to organizational change (Benedettini, Neely, & Swink, 2015; Kowalkowski, Brehmer, & Kindström, 2009). It requires various technological drivers (Gephart, 2004); of which, business intelligence (BI) tops most IT budgets (Gartner Press, 2014). Unfortunately, when the dominant culture

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(manufacturing) and counter-culture (service) engage in making sense of BI, inertia or implementation failure takes over signaling the clash of two cultures (Gebauer, Fleisch, & Friedli, 2005). Notwithstanding this, the servitization research seems more focused on exploring the role of IT as a catalyst or booster of servitization (e.g., Kowalkowski & Brehmer, 2008; Kowalkowski, Kindström, & Gebauer, 2013), rather than understanding what causes the clash when the two cultures make sense of BI.

As any process of change, servitization adheres to an interpretative process (Barr, 1998; Davidson, 2006) in which the manufacturing and service cultures rely on their schemata of interpretations to make sense of BI as they socially construct a new reality, that is, the service transition (Berger & Luckmann, 1967). Besides, BI is the sum of technologies that comprise multiple features that can be utilized independently from one another as one sees fit, which in turn can generate different outcomes (Burton-Jones & Straub, 2006; Leonardi, 2013). Therefore, neither culture will use BI in the same manner. Instead, both the manufacturing and service cultures will view BI differently based on the choices they make about using its features (Leonardi, 2013; Markus & Silver, 2008). In a nutshell, each of the cultures has its assumptions, attributes, and needs that shape the way it uses BI, whereas BI offers features that shape the way the manufacturing and service mindsets think about and make use of it (Leonardi, 2013; Markus & Silver, 2008). In light of the preceding elements, this chapter pictures servitization as an interpretive process during which BI shapes and gets shaped by the manufacturing and service units' interpretations of reality as both mindsets think about and use BI to fulfill the service transition. This chapter brings to fore the notion of BI-in-practice to shed light on the bundle of human and technology that interact to support servitization. This motivation emanates from the evidence suggesting that technologies-in-practice encourage social interactions among actors with different interpretations of reality (Orlikowski, 2000), which in turn yields contestations over meaning and generate unintended outcomes (Orlikowski & Gash, 1992). Therefore, this chapter presents a conceptual discussion that addresses two questions: (1) how BI enacts contests when the manufacturing and

service cultures interact with BI to support servitization? And (2) what happens to the service transition path when BI enacts the framing contests?

13.2 BI and the Enactment of Framing Contests

When firms transition to services, the manufacturing and service cultures often clash (Gebauer et al., 2005). A culture, nevertheless, is an enacted reality that was socially constructed by people drawing on their schemata of interpretations or frames of reference to interpret, experience, and plan action (Orlikowski & Gash, 1994; Brummans et al., 2008). Therefore, an analysis of frames of reference of both cultures uncovers how meaning forms as people of both cultures make sense of BI (Orlikowski & Gash, 1994). These schemata are termed technological frames of reference (TFR) and refer to *the subset of actors' frames that concern the assumptions, expectations, and knowledge they use to comprehend technology…and includes not only the nature and role of the technology itself, but the specific conditions, applications, and consequences of that technology…* (Orlikowski & Gash, 1994, p. 178). In this vein, Fig. 13.1 draws on Galbraith's (2002) study of product-centric (manufacturing) versus customer-centric (service) cultures to illustrate the TFR that guide the way the manufacturing and service units make sense of BI and act upon it (Orlikowski & Gash, 1994). In light of these differences in the respective TFR of manufacturing and service cultures, what follows is a discussion of the conflicts in expectations and actions about BI as the two cultures make sense of BI during servitization.

The TFR of manufacturing and service mindsets regarding the way they think about and use BI fall into three domains. First, the *nature of BI*, which answers the question of what images of BI and understanding of its features and utility people hold. Second, the BI *strategy*, which answers the question of what do people think motivated the adoption of BI and its relative value. Third, the *BI in use*, which answers the question of how people view the daily use of BI and its associated outputs

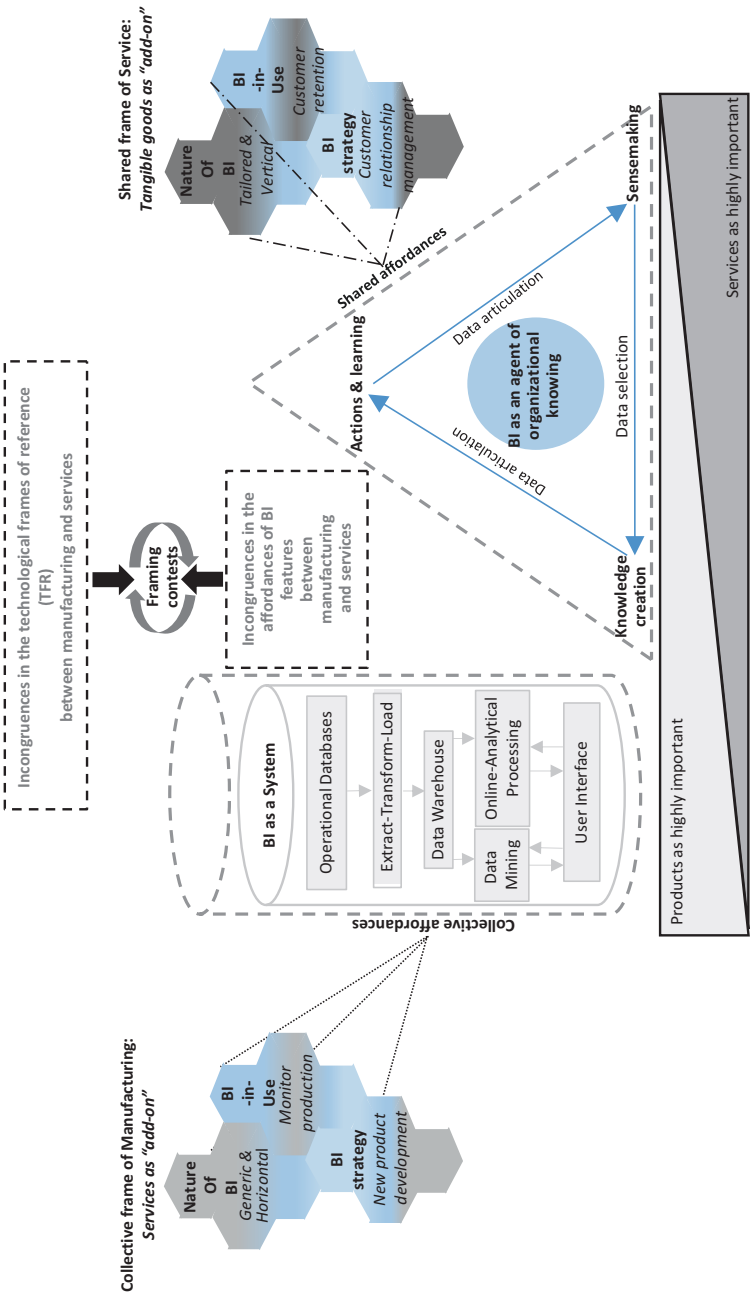

Fig. 13.1 The incongruences causing framing contests as manufacturing and service units shape and gets shaped by BI during servitization. The author's elaboration based on Davidson, 2002; Leonardi, 2013; and Orlikowski & Gash, 1994

(Orlikowski & Gash, 1994). The domains of TFR indicate that BI in manufacturing is generic and horizontal across the organization, as opposed to service culture where BI is synonymous with a vertical solution that is tailored to facilitate the service function (Galbraith, 2002). In manufacturing, BI is adopted to develop new products and improve existing ones.

In services, though, BI is implemented to improve customer relationship management and seek new business opportunities (Galbraith, 2002). BI in use also reveals incongruences between manufacturing and service cultures. In the former, BI is used daily to monitor indicators of production efficiency (e.g., number of new products, % of revenue from products, and market share). In service culture, BI usage aims customer retention through a daily search for expressed and latent customer needs, and customization of the best combination of products to meet customers' needs (Galbraith, 2002). The above-mentioned incongruences—that ensue from thinking about BI and interacting with it (Pinch & Bijker, 1987)—represent the first cause of contests between the manufacturing and service cultures as their assumptions, attributes, and needs shape the way they use BI in servitization (Orlikowski & Gash, 1994).

Furthermore, while people can perceive the technology features, the utility of that technology hinges upon the goals, needs, and behavior of the person considering it (Gibson, 1986). Therefore, the utility of the technology does not depend solely on the technology or the human but the relational interaction between both as technologies offer features and humans choose to appropriate the ones they believe propel action (Leonardi, 2013; Markus & Silver, 2008). This idea is termed "affordances" and represents the way people choose to appropriate certain features of technology (IT use) if they feel such technology offers them affordances (utility) to act upon (Leonardi, 2013; Markus & Silver, 2008). In this case, BI as a technology used by a group of people can offer various affordances to each one of them and thereby each one will enact a different affordance or a combination of affordances as they utilize it (Davern, Shaft, & Te'eni, 2012; Kaptelinin & Nardi, 2006). In this regard, for the manufacturing and service environments, the number of features of BI will generate two different group-level affordances described in Fig. 13.1 as collective and shared affordances (Leonardi, 2013).

A collective affordance is collectively enacted by a group to accomplish something they could not do otherwise (Leonardi, 2013). This type of affordance is often created in environments such as manufacturing where interdependence is limited, and tasks are performed at the individual level then combined to generate the outcome (Leonardi, 2013; Thompson, 1967). The manufacturing environment is characterized by a configurational structure of technology use, that is, group members use BI at maybe the same frequency but in different ways as different BI features offer multiple affordances that might benefit the various tasks they are involved in (Leonardi, 2013). In such a context, a traditional application of BI dominates a system that supports decision-making (Shollo & Galliers, 2016). Accordingly, BI offers manufacturers a formal rational mechanism that integrates internal and external data, analyzes and conceives intelligence out of it, then communicates it through the user interface that offers the option to manipulate it as the business user sees fit (Chaudhuri, Dayal, & Narasayya, 2011). While the BI system relies on an intertwined bundle of technologies, each user will enact affordances they believe are conducive to their task. For instance, planners might use the data mining engine to run predictive analyses of different scenarios, while product designers may see more affordances in the online analytic processing (OLAP) to slice and dice the data for a benchmark of their existing product line with that of competitors. Operational users, on the other hand, will likely utilize the relational database management system (RDBMS) to rapidly execute queries across internal data to quickly eliminate bottlenecks and maintain a lean production.

In contrast, *a shared affordance* occurs in environments like service business where group members use technology in the same way because their work environment involves high reciprocal interdependence and thus necessitates a high degree of interaction, dependability, and coordination to accomplish the project (Guzzo & Shea, 1992; Leonardi, 2013). In the service business, the structure of use is shared as group members use BI at the same frequency and share the same affordances about it, which in turn help them enact the same capabilities and coordinate efficiently to achieve group goals (Leonardi, 2013). Accordingly, BI arises as an agent, which thanks to its practices of data selection and articulation orchestrates an ad infinitum process of organizational knowing that ranges from

sensemaking to knowledge creation and learning (Choo, 2002; Shollo & Galliers, 2016). Following this rationale, BI offers a high capability of data scrutiny that when combined with the interpretations of users can articulate new distinctions across variables that call for comparison, which in turn crystallize common patterns across the different interpretations of users and help them formulate factual hypotheses (Shollo & Galliers, 2016). As a result, BI helps users articulate their gut feelings into acceptable claims by offering them a legitimate format that promotes dialogues and contestations while drilling down into low-level data and rolling up for the high-level ones (Schultze, 2000; Shollo & Galliers, 2016). During this interaction, individuals add meaning to data via the cyclical practices of data selection and articulation where the former produces knowledge, whereas the latter adds meaning to it by uncovering patterns across multiple interpretations, which in turn yields knowledge sharing (Shollo & Galliers, 2016). Only then, organizational learning can commence, and actions can ensue (Shollo & Galliers, 2016). In sum, the incongruences between the types of affordances manufacturing and services enact from BI features represent the second cause of contests between manufacturing and services as BI features shape the way the two mindsets make use of it during servitization (Orlikowski & Gash, 1994).

13.3 BI and the Unintended Outcomes of Servitization

As a change process, servitization (intentionally or unintentionally) shapes or is shaped by the collective frames of groups involved in it (Bartunek & Moch, 1987). This happens because existing collective frames are difficult to alter and influence the way people perceive, interpret, act, and commit to the change (Tichy, 1974). In this vein, old manufacturing collective frames that might turn obsolete and inadequate when servitization occurs will most likely continue to guide the sensemaking of change agents, which in turn will generate conflictual situations and constrain the transformation process and generate unintended outcomes (Orlikowski & Gash, 1992). What follows is an attempt to delineate how such deviation unfolds and at what stage of servitization.

The foregoing literature indicates that organizational change occurs through two hierarchical forms: first-order change and second-order change (e.g., Bartunek & Moch, 1987; Orlikowski & Gash, 1992). The first type of change is an incremental modification of existing collective assumptions and frames that happens within and seeks to reinforce an established modus operandi; the second order of change is a radical modification of collective frames that seeks to reverse the status quo (Bartunek & Moch, 1987; Orlikowski & Gash, 1992). It is worth mentioning though that these orders are non-sequential and vary according to the context of the focal organization, that is, environment, organization, structure, or organizational agents (Orlikowski & Gash, 1992). Therefore, this chapter views servitization as a first-order change based on ample evidence suggesting that service infusion follows an incremental migratory path (Kowalkowski, Kindström, Alejandro, Brege, & Biggemann, 2012; Matthyssens & Vandenbempt, 2008). Afterward, I juxtapose the typology of change outcomes (Orlikowski & Gash, 1992) against the service transition stages (Oliva & Kallenberg, 2003) to examine the nature of change that unfolds during the three stages of servitization (consolidating product-related services, entering the installed base service market, and expanding to relationship-based services). Based on evidence from Oliva and Kallenberg's (2003) study of 11 German capital equipment manufacturers transitioning to services, Fig. 13.2 presents an index of change outcomes (aligned intended, partial intended, and unintended). This index assesses the nature of outcomes ensuing from the manufacturing and service framing contests that BI enacts (Orlikowski & Gash, 1992).

13.3.1 Stage 1: Consolidating Product-Related Services

The idea here is that since most manufacturers offer services to undergird their products, they only need to consolidate their existing service base under a separate unit as a starting point for servitization (Oliva & Kallenberg, 2003). This step is often motivated by a willingness to integrate fragmented services to boost product sales and enhance customer

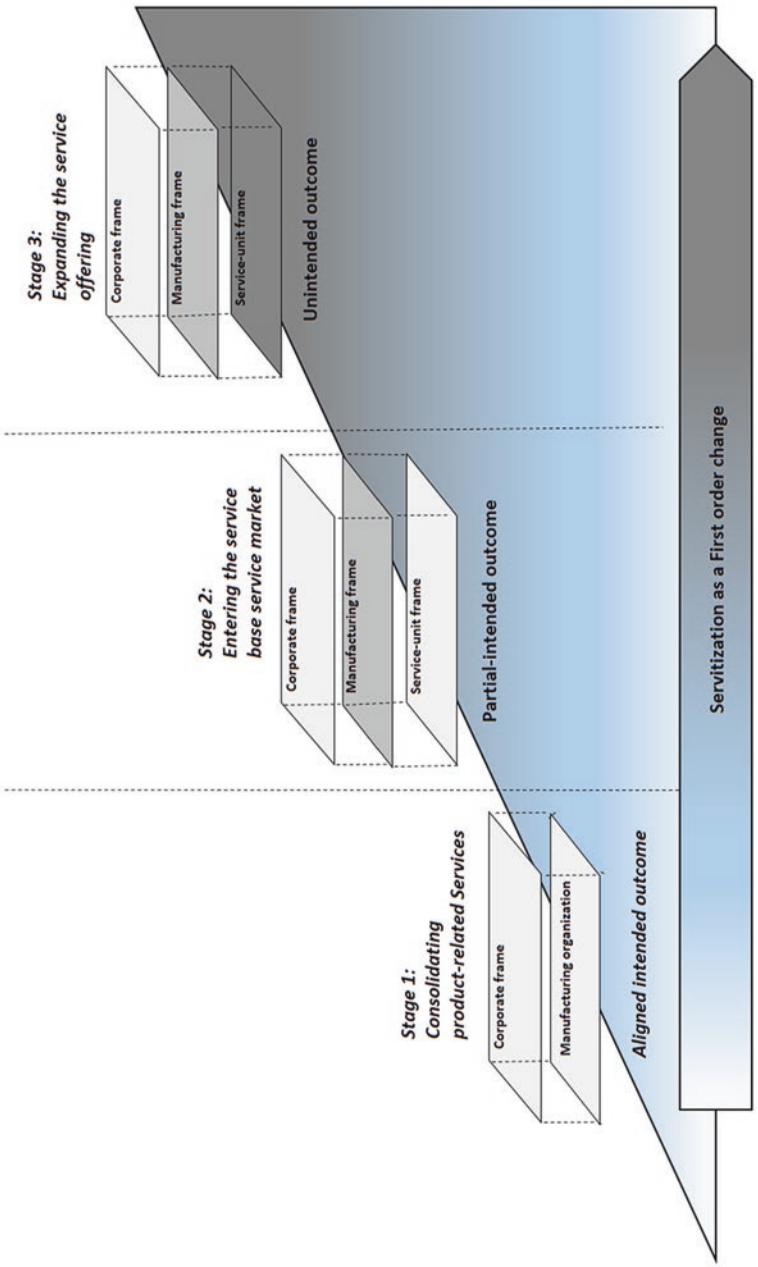

Fig. 13.2 The types of changes that unfold as collective frames of manufacturing resist the change of servitization. The author's own elaboration based on Oliva & Kallenberg, 2003 and Orlikowski & Gash, 1992

satisfaction ratings (Oliva & Kallenberg, 2003). This step emanates from a strong desire of the corporate unit to improve the delivery of services offered and the development of new ones to diversify the services provided (Oliva & Kallenberg, 2003). During the consolidation of product-related services, BI is adopted to monitor service delivery and the share of services in total revenues. This stage generates an aligned intended outcome because both the corporate and manufacturing frames are congruent. This stage witnesses a dominant corporate frame that intends to consolidate services, for which it enjoys support, agreement, and commitment from the manufacturing unit since the new change rhymes with its collective frames and necessitates no modification in the existing frames to fit the concomitant transformation (Oliva & Kallenberg, 2003). This aligned intended outcome also reflects a traditional understanding, rooted in the existing manufacturing frames, of BI usage as a horizontal system for monitoring production indicators.

13.3.2 Stage 2: Entering the Installed Base Service Market

When a new opportunity for profit emerges, organizations experience different changes (processes or structures) to fit the service market (Oliva & Kallenberg, 2003). This new reality, however, jeopardizes the previous degree of alignment and agreement between the corporate and manufacturing units and results in a partial-intended outcome following two instances (Orlikowski & Gash, 1992). First, the manufacturing group resists to change and retains its pre-change frames because it involves the shift from a frame of equipment design to a one of repair and maintenance (Oliva & Kallenberg, 2003). Further, the collective frames of manufacturing centered on the notion of services as add-ons fuel further resistance to change when it senses the need for a shift to new collective frames that view goods as add-ons (Oliva & Kallenberg, 2003). Second, the new service unit exhibits collective frames that fit the change intended by the corporate and sees its BI system run as a separate profit center (Oliva & Kallenberg, 2003). Further alignment emerges as the corporate guards the service unit against the collective

frames of manufacturing to develop an efficient service organization and expand its installed base service market.

13.3.3 Stage 3: Expanding to Relationship-Based Services

Once a fully operational service unit is put in place, expanding to relation-based services then follows via two transitions: from transaction to relationship contracts and from product efficacy to process-oriented services (Oliva & Kallenberg, 2003). The transition toward relationship contracts is rooted in a wish to capitalize on the separate service unit and augment its capacity utilization (Oliva & Kallenberg, 2003). This scenario engenders an unintended outcome as the service unit accepts the change but perceives it as incongruent with its collective frames for the new transition requires the outsourcing of its maintenance function and a lengthy process of establishing enduring relationships with the end-user. This incongruence also dictates a shift in BI usage from one that offers affordances to track inventory and repairs to another that monitors customer relationship management. Likewise, the transition toward process-oriented services shifts the focus from the product at the heart of the value proposition to the product as part of the end-user's process (Oliva & Kallenberg, 2003). This scenario also generates an unintended outcome as the new collective frames centered on solutions attempt to supplant the existing collective frames of manufacturing (Oliva & Kallenberg, 2003). Both instances suggest a high likelihood for the existing collective frames of manufacturing and services to engage in a different vision from the one initially intended by the corporate.

13.4 Conclusion

Servitization is a complex and iterative process that implies a shift in mindsets toward a service-enthusiastic culture (Gebauer et al., 2005; Homburg, Fassnacht, & Guenther, 2003). There exists, nonetheless, a

chasm among scholars regarding the best form of initiating a service-oriented culture with minimum internal challenges (Storbacka, Windahl, Nenonen, & Salonen, 2013). While some suggest that a separate service unit would infuse service orientation without disrupting the manufacturing culture (Oliva & Kallenberg, 2003), others recommend cross-functional integration between units to dodge organizational conflicts between the product and service units (Kindström, Kowalkowski, & Nordin, 2012; Storbacka et al., 2013). Notwithstanding this, both scenarios eventually witness more interactions between the service and manufacturing units, which in turn might translate into a clash between a dominant culture (manufacturing) and counter-culture (service) and veer the organization from the service transition path toward "the service paradox" (Gebauer et al., 2005). In response, this chapter follows the steps of Orlikowski (2000) and presents the notion of BI-in-practice to shed light on BI as a material artifact that could trigger sensemaking of people and stimulate action (Garreau, Mouricou, & Grimand, 2015; Jarzabkowski & Kaplan, 2015). The key word here is "stimulate action" which hints that the importance of artifacts lays in the outcomes they produce through their usage (Jarzabkowski & Kaplan, 2015). Accordingly, this chapter demonstrates that when two divergent mindsets (manufacturing and service) make sense of BI and act upon it the result is meaning contests and unintended outcomes (Orlikowski & Gash, 1992). In this vein, this chapter examines the usage of BI in the context of servitization. Particularly, the way BI influences and gets influenced by the manufacturing and service mindsets in the dynamics of sensemaking. In this regard, this chapter uncovers two sources of framing contests that arise as the manufacturing and service mindsets interact with BI. First, the incongruences across the three domains of TFR ensue when the manufacturing and service units think about BI and interact with it. Second, the incongruences between the types of affordances manufacturing and services enact as they use BI. Accordingly, the service transition process involving the manufacturing and service cultures is unlikely to occur unless both groups converge on a shared appropriation of BI features (Leonardi, 2013). Put differently, each time the two cultures fail to realize the affordances BI provides jointly, the service transition will witness unintended outcomes at the installed base service market (Oliva & Kallenberg, 2003).

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A Theory of Practice Beyond the Human: From Doings with Things to Doings as a Tendency of Things

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Abstract

Taking perspectives from work on materiality in strategy as practice (SAP), we argue for progress in the materiality turn through a more effective rehabilitation of the status of the material in SAP studies. We review a range of theoretical approaches that motivate the material turn in SAP and organize them according to how they view the material: a passive knowable, a mediator enacted when used, or a protean entity with humanlike characteristics. We argue that these accounts challenge any exploration of the interrelationships of the material and the human in producing social order and reality without rejecting representation or material agency. Against this backdrop, we ground the doings of strategy and representation in the logics of semiotics to rehabilitate the status of the material and acknowledge form patterns and emergence as vehicles in mediating the relationality of the material and the human.

Keywords: materiality, semiotics, ontology, practice theory, strategy as practice, emergence.

Introduction

Inspired by research on material culture, SAP scholars extend linguistic representation by a return to the 'thingness of things' to attend to the ways matter intrudes into our representational and discursive frameworks (Dameron, Lê, & LeBaron, 2015; Lê & Spee, 2015). This is apparent in the works that explore the mediative role of the material in strategy work (Jarzabkowski & Kaplan, 2015b; Spee & Jarzabkowski, 2009; Whittington, 2015), and the effect of non-verbal representation (material and visual) on institutional and strategy processes (Bourgoin & Muniesa, 2016; Knight, Paroutis, & Heracleous, 2018). This return to the 'obdurate thingness' of things is subject of our present, the actual, the empirical, and therefore much of it did not go beyond the visible patterns of materiality (artifacts, sites, tools, websites, and whatnot) to understand how the material obduracy to human representation unveils, the uniqueness of each material, and the secret workings of absent elements in the relationships between the material and the human (Cooren, 2020; Crossland & Bauer, 2017; Fowles, 2016). This state of affairs is due to an ontological dichotomy between humanists and post-humanists views of the material, which either ends up projecting humanist attributes (agency, structure, cognition, mind, politics, power) on a material relegated to the background or treats it as indistinctly human and grants it vitality or human agency (Callon & Law, 1997; Pickering, 2001; Schatzki, 2001).

Humanist explorations of the material treat it as an indexical sign that shapes our representations and discourses about it which points to the thingness of the material and re-inscribes the Cartesian separatism of mind and matter, known and knower, and continues thinking of the world in terms of things and their representational signs (Crossland & Bauer, 2017). Post-humanists attend to the protean agency of things by rejecting linguistic representation of symbols that relate arbitrarily to their objects of reference rather than by expanding its scope to accommodate all interactivity, i.e.,

linguistic or non-linguistic representation (Rosiek, 2013; Rosiek & Atkinson, 2005; Rosiek, 2018; Kohn, 2013). This sloughing off of semiosis resolves into the same separatism they set out to sideline because when they call for material agency or accounting for the material domain, they are still tacitly dividing the human from the non-human (Crossland & Bauer, 2017). The conflation between language and representation draws from the new materialists' denial of representation (Bennet, 2010) and post-structuralists' symmetrical treatment of the human-material couplet by depriving the human from their intentionality and conferring agency to the material (Latour, 1993; 2004b). This leaves the relationality of the material and human unchartered, let alone its experience and all the possibilities of their relationship and the ensuing patterns of social order and emerging phenomena (Crossland & Bauer, 2017).

On Peircean grounds, the indiscriminate treatment of the human and the material as a solution to their inherent separatism leads to a flattening of the world that limits agency and thought to the realm of the actual 'secondness' and hence prevents us from harnessing the non-human properties 'thirdness' whereof order emerges from disorder (Deacon, 2012; Kohn, 2013). What we share with the material is not our entanglement (e.g. Barad, 2003, 2007) or symmetry (Latour, 1996; 2004b) but the fact that we are parts of semiosis which permeates and makes up shared semiotic propensities that make human and material relations possible (Kohn, 2013, 2014). These participants in the semiotics process materialize not by their preexisting nature or qualities, but through their engagement in the process which unfolds according to their interaction with other participants and with various circumstances (Crossland & Bauer, 2017). Peirce's semiotics provide a way to escape the entrenched Cartesian divide of subject and object (Crossland & Bauer, 2017) by viewing the encounters between human and material as a material semiotic relation whose structure is construed by a complex mixture of signs, interaction, and habits (Rosiek, 2018). It

allows us to bypass the dualism of the human and non-human contours when attending to their encounters as active agents of meaning beyond the frontiers of the material, discursive and the human domains, and opens up the possibility to explore the quality of resistance, potential, and mediation of semiosis (Rosiek, 2018; Crossland & Bauer, 2017; Colapietro, 1989). Therefore, we argue that Peirce's semiotic model allows us to avoid the reductionist trap of flattening the human-material couplet to no-distinction, which excludes representation and reduces the material to knowable objects or symbols (Kohn, 2013).

The material turn in SAP makes it impossible to confine our focus to an epistemological concern that limits our strategizing enquiries to how humans use or make sense of the material (Cabantous, Gond, & Wright, 2018). Our stand is thus ontological to allow us the possibility to create the conditions for a new post-humanist agenda for SAP that reformulate the doings of strategy as a semiotic process of signification. In the next section, we provide a review of the three accounts of the material in SAP: Post-Wittgenstein's 'human/material' asymmetry, Latour's 'human-material'symmetry, and Barad's 'human-material' entanglement. We then go to discuss the tensions these accounts nurture vis-à-vis representation, social production, agency, and action. Next we propose a Peircean turn to the ways the doings of strategy materialize through form patterns that create order out of disorder and mediate meaning (Crossland & Bauer, 2017; Fowles, 2016) as they emerge from and relate to other non-arbitrary and non-human modalities of representation, and pervade the human and material worlds and nurture underexplored properties distinct from linguistic modalities of representation (Kohn, 2013, 2014; Nöth, 2011; Queiroz & Merrell, 2006). This form, constitutive in its absence, is what we highlight in the final section by adopting a non-representational account of the material to account for the semiotic absential logic behind the relationship of the material and the human (Deacon, 2012).

Method

This article attempts to weave together a vast array of theoretical positions to discuss the status of the material in the doings of strategy in light of the breadth of the literature scholars cite, and the range of concepts and theory they engage with. To do so, we opt for a systematic search to give a sense to other researchers of our exclusion and inclusion criteria (Lee, 2009; Tranfield, Denyer, & Smart, 2003), and offer an ontological argument based on a scientific empirical synthesis (Rousseau, Manning, & Denyer, 2008) that carry relevant contribution to the SAP scholarship (Macpherson & Jones, 2010). Our search process, illustrated in Figure 1, follows two inclusion criteria that emanate from two research questions: How is strategizing and materiality depicted as a relational couplet? How does the relationship between strategizing and materriality conduce the doings of strategy to emerge?

We begin with collecting the keywords that characterize the strategy as practice literature from the most cited articles and reviews of SAP (e.g., Johnson, Langley, Melin, & Whittington, 2008; Whittington, 1996; Whittington, 2006; Feldman & Orlikowski, 2011; Barry & Elmes, 1997; Balogun & Johnson, 2004; Johnson, Melin, & Whittington, 2003; Jarzabkowski, Balogun & Seidl, 2007). After we elaborate our search string ("strategy as practice" OR "strategy-as-practice" OR "SAP" OR "S-as-P" OR "S as P" OR "S-A-P" OR "strategizing"), we undertake a search on Elsevier's Scopus, praised by many as the database par excellence for systematic literature reviews (Börner et al., 2010; Falagas, Pitsouni, Malietzis, & Pappas, 2008), for all publications that contain any of the identified keywords in their title, abstract, or text (Newbert, 2007). Our search on Scopus returns 1923 hits including conference papers and book chapters, which are subsequently eliminated once we limit the search to peer-reviewed articles published in the 1582 ABS ranked journals for it offers an extensive cross-disciplinary list subject to a documented hybrid verification

and iterative ranking process based upon peer reviews, peers' consensus, and citations (Mingers & Willcocks, 2017; Morris, Harvey, & Kelly, 2009).This in turn gives us a credible guide to account for the quality standard necessary for developing a high-quality literature synthesis (Macpherson & Jones, 2010; Rousseau et al., 2008). This imposition returns 340 articles that belong to and lie at the fringe of SAP studies and management and organization theory (OMT) and science and technology studies (STS). After we read the abstracts of the 340 publications, we identify 132 articles where both the material and startegzing appear as two variants that relate to each other. As we read all introductions, we exclude articles that do not engage to an adequate degree with the relationship between the material and strategizing (Mackay & Zundel, 2017) . This reduce our sample to 79 publications, which we read in full and expand to 90 articles after we come across other contributions as we read the articles and check their citations and lists of references (Lee, 2009).

Insert Figure 1 about here

Human-material dualism: Humanist asymmetry

The practice of strategizing is an unfolding series of doings and sayings connected by social relations and practical understandings of a certain activity of 'x-ing' (Schatzki, 1996). Although anchored in the mind, these forms of understanding of 'x-ing' exist in sofar as they manifest themselves in regular bodily expressions rather than mere cognitive or symbolic sequences, and therefore shift the locus of social order from the symbolic orders of the subject (discourse, mind, communication) to bodily expressions (Reckwitz, 2002b). Naturally, it would seem that this conceptualization of 'x-ing' would bring the material to center stage as these bodily doings,

although not all, must be performed with 'stuff' (Reckwitz, 2002b). After all, if social practices are bodily forms of doings organized by a certain practical understanding, then this latter must involve human and non-human agents (Reckwitz, 2002b). Surprisingly, the imprint of Schatzki (1996; 2001, 2005)'s conceptualization of the material as 'setting' and Giddens (1984)'s view of things as 'resources' of power characterizes the SAP humanist treatment of the material as a 'supplement' rather than an integral element of the doings of strategy to be reckoned with (Reckwitz, 2002b). The human here is the locus of materialized understandings of social practice for their handling of the material is what unfolds the materiality of things and implies a relation of practical understanding as opposed to a passive material relegated to the background of the social practice, when not in use (Reckwitz, 2002b; Schatzki, 2001, 2005).

This 'human/material' asymmetry, illustrated in Figure 2, further draws from three cultural theories wherein the status of the subject shifts from the mind (mentalism) to discourse (textualism) to interactions (inter-subjectivism), yet the nature of the material is limited to 'something we known' for mentalists, 'something we interpret' for textualists, or 'something we talk about' for inter-subjectivists (Reckwitz, 2002b). None of these cultural theories inquire or revise the causality or significance of the material beyond its mere existence as a byproduct of social order produced by cognitive or symbolic structures that drive human action and interactions (Reckwitz, 2002a, 2002b). The three cultural theories objectify the material as a supplement to social order, not a cause or a condition to its emergence (Derrida, 1998; Reckwitz, 2002b). Therefore, it is the systems of meaning (mind, discourse, communication) that give the material its symbolic quality (materiality) and make it visible (Reckwitz, 2002b). The material does not exist 'out of itself' but as a carrier of meaning within the symbolic orders that make the social world (Reckwitz, 2002b). SAP mentalists, influenced by Saussure and Levi-Strauss's

structuralism and semiotics, assert that symbolic orders reside in the mind in the form of cognitive (conscious/unconscious) structures and determine what can exist as an object of knowledge (Reckwitz, 2002b). They gravitate toward either cognitive structures or knowledge objects without theorizing the relationship between the mind and the material. Scholars draw from personal construct theory (Kelly, 1955), activity theory framework (Leontiev, 1978; Vygotsky, 1978), and mental models and causal maps (Priem & Rosenstein, 2000) to look at how managers think about the material as schemes of knowledge production, and analyze how their cognitive representation of these objects translates into strategizing practices at the group and organizational levels (e.g. Jarratt & Stiles, 2010; Jarzabkowski, Giulietti, Oliveira, & Amoo, 2013; Thomas & Ambrosini, 2015; Wright, Paroutis, & Blettner, 2013).

For their opponents, SAP textualists, rooted in the works of Foucault, Geertz, Derrida, and Luhmann's poststructuralism, symbolic orders are situated outside the mind in extra-cognitive symbolic structures (discursive or textual) and produce the material. The material does not preexist prior to our representation but surfaces through discursive practices or symbolic structures (Reckwitz, 2002a, 2002b). The focus is on how written discourses through their signs produce materials and allow actors to make sense of them and how the symbolic properties of materials render them sensemaking and knowledge resources that supplement cognitive structures (e.g. Arnaud, Mills, Legrand, & Maton, 2016; Cornelissen, Mantere, & Vaara, 2014; Hardy & Thomas, 2015; Heracleous & Jacobs, 2008b, 2008a; Stigliani & Ravasi, 2012; Buergi, Jacobs, & Roos, 2005). These studies are rooted in sensemaking (Weick, 1995), discourse (Foucault, 1972), constructivist theory of knowledge (Piaget, 1971), and embodied realism (Johnson, 1987; Lakoff, 1990).

SAP inter-subjectivists locate symbolic orders in language based social interactions and therefore view the material as interpreted and constitutive in interactions (Reckwitz, 2002a, 2002b). They view materiality as part of the life-form of strategizing practices as boundary spanners across organizational levels, which permits exploring why and how materials enable or constrain interactions across organizational levels. Scholars maintain that human agency is the driver of social order and material manifestations are constitutive of reality and understood as gateways to the intended actions and interactions of human actors (e.g. Carlile, 2015; Schoeneborn, 2013; Spee & Jarzabkowski, 2009; Carlile, 2002; Vaara, Sorsa, & Pälli, 2010; Bechky, 2003; Cooren, 2004; Kornberger & Clegg, 2011). Inter-subjectivists draw from language games (Wittgenstein, 1953), boundary objects (Carlile, 2002; Bechky, 2003), textual agency (Cooren, 2004), textual constitution (Fairclough, 1992), classification of speech acts (Searle, 1979), framing theory (Goffman, 1959), discourse embedded in practice (Foucault, 1977; Knights & Morgan, 1991), speech act theory (Austin, 1962), and communication as constituve of reality (Ashcraft, Kuhn, & Cooren, 2009; Cheney & Ashcraft, 2007).

Insert Figure 2 about here

Human-material dualism: Post-humanist symmetry

To capture the humanistic treatment of 'the human-material' couplet we could borrow Callon and Law (1997)'s (1986) portrayal of 'Andrew the strategist'. Andrew and his computer are definite and independent units and as long as Andrew or his computer are out there, detached from any practicality or impracticability, they stand apart from any attribute of 'becoming something for someone'. In Heidegger terms, they are 'present at hand' (Heidegger, 1962). What would then

happen to Andrew and his computer as they both engage in the practice of strategizing? Andrew's computer will lose its distinct identity and will behold its being to the practice of strategizing. And so does Andrew. In so far as strategizing goes, Andrew and his computer are 'ready to hand', i.e., they both come to being as means to an end, in this case the practice of strategizing (Heidegger, 1962). How if then Andrew's computer breaks or loses its functionality? How if it becomes faulty? In her objectivist post-humanist account, Knorr Cetina (2001) has noted that this could be the case only when practice is a normative regularity conditioned by 'habits' and 'routines'. Following her account, practice dealing with knowledge is never conventional and procedural; it is dynamic, creative and unfolding. The material in this post-wittgensteinian view maintains the traditional isolationism of the individual and the social (Simpson, 2009), relies on a humanistic agency, grounded in Giddens's structuration theory (1984), and restricts the material to practice, i.e., it materializes within it; not outside it (Whitford & Zirpoli, 2014; Reckwitz, 2002a). However, if the bodily doings involve the non-human, following Latour's participative artefacts, present in later works of Schatzki (2001, 2002, 2005), then the material is also a site of practical understanding in the same way bodily forms are (Reckwitz, 2002a). Its materiality unfolds as materialized understanding within a certain social practice, and if it were to fade away that social practice will cease to exist (Reckwitz, 2002a). Further, materialized understandings (incorporated in the material) do not influence but determine practical understandings (expressed in the human body), i.e., the former is parallel to the latter and social reproduction is possible when both localized forms of understanding occur (Reckwitz, 2002a). Social orderliness hence emerges from social practices localized in bodily and material understandings of a certain practice and propensity for action belongs to both the human and the material (Knorr Cetina, 1997, 2001; Reckwitz, 2002a).

This post-humanists account reinstates the role of the material in producing social reality and imposes uniformity between the human and the material as equivalent agents in the coming through of social practices (Schatzki, 2001). The social is no longer seen as asymmetrical across its constituents but symmetrical and formed via the social dynamics of heterogeneous elements, i.e., the human and the material (Callon & Law, 1997). In this respect, both the human and the material are irreducible components of the network whither they practice 'heterogeneous engineering' and beyond which no element can exist for the human is a network and so is the material (Callon & Law, 1997). So neither the human nor the material is a solid or a stable element but both are effects of relationships bound to networks that yield them, i.e., their identity changes following their networks, they exist contemporaneously with these networks, and they enact the same networks (Callon & Law, 1997). Therefore, 'Andrew the strategist' is a network composed of Andrew besides the entities (his colleagues, commute, computer, fax, secretary and whatnot) that make strategizing activities possible (Callon & Law, 1997). This line of thinking paves the way to Post-humanists' conceptualization of the material as a network of human and material involved in developing ideas and practices as depicted in Figure 3. In this vein, the practice of strategizing is a creative process mediated by the use of the material whose meaning comes out in use and affordances allow interactions and alignments across practices (e.g. Demir, 2015; Giraudeau, 2008; Jarzabkowski & Kaplan, 2015; Leonardi, 2015; Werle & Seidl, 2015; Gherardi, 2010; Jarzabkowski, Paul Spee, & Smets, 2013; Orlikowski, 2000; D'Adderio, 2008; Kaplan, 2011; Leonardi, 2011; Whittle & Mueller, 2010; Feldman & Orlikowski, 2011, Jarzabkowski, 2008, Jarzabkowski & Spee, 2009, Whittington, 2010). Post-humanist symmetry finds theoretical scaffolding in Giddens's structuration theory (1984), the notions of epistemic work and epistemic objects (Knorr Cetina, 1999; 2001), careers of rationality (Cabantous & Gond, 2011; Dodgson,

Gann, & Phillips, 2013), actor network theory (Latour, 2005), technologies in practice (Orlikowski, 2000), performativity theory (Callon, 1998), and obligatory points of passage (Latour, 1987).

Insert Figure 3 about here

Sociomaterial entanglement

A post-humanist would argue that strategizing is an effect of all arrays of objects and dispositions, whereas a humanist would determine that the human agent is the locus of social reproduction and reduce the compound elements to a mere passive prop (Callon & Law, 1997). For the former, action is an attribute of the network; for the latter, action is a characteristic of the human (Callon & Law, 1997). And here lies the conundrum of the material turn in SAP that balances between a post-wittgensteinian 'human/material' asymmetry and wishes for a Latourian 'human-material' symmetry (Reckwitz, 2002a, 2002b). While both views maintain the 'human-material' separatism, their debate is ontological par excellence in sofar as it is about the status of the material in the production of social order. SAP humanists explain the practice of strategizing through human variables and attributes rather than through the struggles of the material as it constitutes the practice of strategizing with the human (Pickering, 2001). For SAP post-humanists, the material is recalcitrant and resistant to our modes of representation that bind its meaning to the role it plays within the human context (Barad, 2003; Bennet, 2010; Crossland & Bauer, 2017; Harman, 2002; Latour, 2004). This recalcitrance of the material is at the heart of Latour (2004)'s call for a new social inquiry that brings to fore 'the materiality of the matter' and Harman (2002)'s Heideggerian

'ontology of the matter' that sets non-human things as 'being-in-themselves' regardless of how we perceive or represent them. The material thus carries its meaning within its materiality and refutes our biased unitary view of it as a passive thing that awaits our cognitive or symbolic representation to reveal its being (Barad, 2007; Bennet, 2010; Rosiek, 2018).

Sociomateriality aficionados or the new-materialists in SAP re-conceptualize the material as vibrant and impulsive for action and theorize social order as a resultant of the entanglement between the material and the human in ongoing intra-activity (see Bennet, 2010). Anchored in Latour's post-structuralism (1987), and extended in the works of new materialists (Barad, 2003, 2007; Bennet, 2010), SAP new materialists build on post-structuralists' critique of human language and departs from its human-material dualism. Scholars following this tradition view the material and human as entangled in an ongoing process of intra-activity and view agency as material enactment. Building on post-structuralists (Latour, 2005; Mol, 2002; Pickering, 1995; Knorr Cetina, 1997), and newmaterialists (Barad, 2003, 2007; Bennet, 2010), the sociomaterial stream, as Figure 4 suggests, focuses on the constitutive dynamics between the material and the human and how they enact agential cuts and generate performative implications on the reconstitution of new practices and outcomes (e.g. Bell & Vachhani, 2019; Leonardi, 2012, 2013; Orlikowski, 2010; Orlikowski & Scott, 2014, 2015; Orlikowski, 2007; Scott & Orlikowski, 2014). Barad (2007) captures this impulse for action with her phrase "meeting the universe halfway" through which she seeks to direct our attention to a potrean and obdurate matter that we come across as we inquire about it (Barad, 2007; Rosiek, 2018). This proclivity for action is also present in Latour (1996, 2004b)'s actor network theory, which conceptualizes matter as 'actant', i.e., capable of doing and altering the course of action. For new materialists (Barad, 2007; Bennet, 2010) the material is not a passive object that awaits humans' representation nor are our biased

interpretations essential to the constitution of reality that is obdurate and defies our interpretative frameworks (Rosiek, 2018).

Insert Figure 4 about here

Beyond dualism and entanglement

New materialists (e.g. Barad, 2003, 2007; Austin, 1962; Bennet, 2010; Butler, 1989; Haraway, 1991; Pickering, 1995; Rouse, 1996) contest the power of words to represent or determine the material and present performativity as an alternative elaboration of the material as active and agentic participant in constituting our social world and shaping its social practices (Barad, 2003; Schatzki, 2001). Their performativity converges with post-structuralists' (Derrida, Latour, late Foucault) rebuttal of representationalism, but diverges from them in acknowledging material agency. For instance, they criticize Foucault (1980)'s link of discursive practices to material bodies in his analysis of power without pointing to the historicity of the body that forms its materiality and affects disciplinary power (Barad, 2003, 2007). Besides, they criticize the Foucauldian restriction of power to the realm of the social and relegating matter to a passive product rather than active agent in the materialization process of bodies (Barad, 2003, 2007). This anthropocentrism prevents Foucault, according to them, from taping into the intricacies of the human and the material because it re-inscribes their Cartesian divide and theorizes agency as a human capability, and therefore overlooks the profound intrusion of technology in the materialization process of human bodies (Barad, 2007). Although their critique of Foucault is sound, it concerns, to paraphrase Massumi (2009), the works of 'Foucault before Foucault', i.e.

his works prior to his lectures about the notion of government of things at the College de France between 1978 and 1979. His lectures on governmentality seem to have shifted his obsession with anthropocentrism toward relational agency despite not adventuring in the territory of relationship between the human and material (Foucault, 2007; Lemke, 2015). The new materialists' problem with late Foucault's post-representationalism is his failure to re-inscribe the materiality of the body as active and his limiting of construction to discursive practices without exploring how such formation varies in relation to non-discursive practices (Hennessy, 1993; Barad, 2003, 2007). For them, a post-representationalist account should exceed discursive practices to capture the intra-actions that link material and non-discursive forces and this is the crux of their sociomaterial argument that considers all material-discursive and non-discursive forces and all forms of agency (human and non-human), and scaffolds causality of social production in the historicity of bodily matters (Barad, 2003, 2007). Their thesis ousts linguistic representation from the way we think about the material as passive and rigid or changes within the context of linguistic representation that conditions its status (Lemke, 2015; Barad, 2003, 2007).

Their account turns the metaphysics of representationalism on its head and accuses it for holding scientific investigation hostage of inquiries about the correspondence and accuracy of the representation to the entities independent from it after it has separated the domain of things from that of words (Barad, 2003, 2007). Representationalism, thus, starts on the wrong foot and should start on a fresh note; another metaphysics that does not separate the physical from the metaphysical and therefore does not distrust the material and reduce the relationships of nature to their preexisting inherent properties and antecedents 'relata' (Barad, 2003, 2007). This is at the heart of Barad's agential realism that motivates the sociomaterial stream in SAP as a lens through which we acknowledge our status in the becoming and knowing of nature and the material resorting the

separatism of individual entities or cause and effect (Barad, 2003, 2007). Neither words nor things possess inherent properties that could distinguish them into known or knower or into two separate entities, and thus the mediating role of representation between subject and object crumbles as the focus shifts toward the causal relationality between practices rather than words and phenomena rather than things (Barad, 2003, 2007). Their account is not without merit as they shift the asymmetry/symmetry debate of the material from epistemological bouncing between representation and reality to ontological inquiries about the nature of our social practices (Barad, 2003, 2007). They reject The Cartesian ontological separation between representing subjects and things to represent and substitute with a performative understanding of the material that shifts attention from linguistic representation to the nature of our practices (Barad, 2003, 2007). Performativity is ontological, rooted in agential realism, rather than epistemological (Pickering, 1995) in so far as it does not concern itself with the relationality of the human and the material in producing the social as much as the nature of that production (Barad, 2003, 2007; Haraway, 1991; Butler, 1993). Post-humanist performativity is thus relational par excellence and causality is a matter of intra-action between practices 'embodied in all configurations that produce the material', and phenomena 'the relations of the material produced' (Barad, 2003, 2007). Contrary to representationalism, phenomena here mark the entanglement rather than the separability of the subject and object and do not emanate from relata as in atomism, but it is the intra-actions that bring relata to life within phenomena 'relations' and denote a shift from interaction that implies an ontological separation between preexisting entities and relata (Barad, 2003, 2007). Contrary to epistemic cut or Cartesian cut that presupposes an inherent separation between known and knower, intra-actions host causality and agency because it determines the boundaries and meaning of the parts of the phenomena by separating the subject from the object through what Barad terms

'agential cut' to emphasize the enacting of relata within phenomena, i.e., intra-actions are the agent enacting relata and hence the separation between the subject and object (Barad, 2003, 2007). Agential intra-activity is the crux of this post-humanist account for it allows for objectivity (a differential marking and understanding of human and material within phenomena), since the epistemic exteriority between the knower and the known has already crumbled at the outset of their account, and enacts a causal structure between causes (objects) and effects (agencies) within phenomena (Barad, 2003, 2007).

To sociomateriality proponents, there are only phenomena in the world that come to light through intra-actions; there are no things or concepts; nothing is ideational but everything is actual material-discursive configuration 'practice' including talk and discourse (Barad, 2003, 2007). This is not to be mistaken with Foucault's suggestion that historically situated material practices sustain discourse, which assumes an exterior separation between the material and the discursive until the mediative role of representation brings them together (Barad, 2003, 2007; Butler, 1989). Rather, the material and discursive are inseparable ongoing components of intra-activity that produce phenomena and both are active agents in the dynamic process of intra-activity that enable or constrain the materiality of phenomena (Barad, 2003, 2007). They treat the human and non-human bodies as material-discursive practices since their differential intelligibility emerges through the anti-deterministic process of intra-activity 'performativity' (Barad, 2003, 2007). Under agential realism, issues of social orderliness, emergence and becoming of the social world are all rooted in agential intra-actions that enact agential cuts to articulate a differentiation between 'cause' from that which it marks 'effect' (Barad, 2003, 2007). These marks on the components of the phenomena means that agential separatism is a matter of changes in the material and discursive forms that occur through multiple intra-actions and form the contours of components of

phenomena 'human/non-human' (Barad, 2003, 2007). Agency here is neither a human nor non-human attribute, but is enacted possibilities and constraints to the changes of material and discursive practices (Barad, 2003, 2007). Discursive practices are not human or fixed either, but dynamic material configurations that enact different contours and meaning (Barad, 2003, 2007). The material is not a rigid thing, but is the shape that the intra-active doing of agency takes (Barad, 2003, 2007) akin to what Bennet (2010) describes as the material irreducible to the human context and whose vitality surprises our eyes, or Harman (2002)'s Heideggerian material-oriented philosophy that posits that things carry their meaning in themselves beyond what meets our eyes and thoughts. New materialists' agential realism grants vitality to substance and sets out the ground to question the representational power of semiotic signs and resurrect materiality as a mediator of our encounters with reality (Rosiek, 2018). Agency is thus in the material or in the process of intra-actions (Barad, 2003, 2007) to subdue human agency and shift to ontology to express its potency over epistemology; i.e., reality escapes our corresponding representation of it (Rosiek, 2018). Their post-humanist turn rests upon an agential realism that re-conceptualizes matter as active agent in social construction rather than a mere passive resource in the human's realm (Lemke, 2015), and challenges the same notion of strategizing practice as locus of social orderliness sketched in the contributions of Bourdieu (1972, 1977), Dreyfus and Dreyfus (1986), Giddens (1984), and Schatzki (1996). Not to mention that these contemporary accounts of strategizing practice remove the separation between habitual and creative action contrary to Knorr Cetina (1997, 2001)'s notion of epistemic practice which makes the case for the dynamic and relational knowledge and creative practice that shapes itself and those involved in it.

These participants are humans and also non-humans, which Knorr Cetina (1997, 2001) refers to as epistemic to delineate their open and unfolding character. This unfolding is molded following

Lacan's wanting (1975) akin to a child's permanent lack to match and envy of their perfect image held by their parents. Our envy of the perfect experience with epistemic objects will persist in the continuous unfolding of our experience with epistemic objects as long as it cannot match its ideal. This kind of post-humanism pays due attention to the visible site of encounters of the human and material agency (Pickering, 2001), but how about whatever emerges from the coupling of the material and the human? is attention to the visible enough to reveal the secrets workings behind its manifestation? Pickering imports Schivelbusch (1986)'s railway journey where the human experience of the train created a new emergent phenomenon 'panoramic seeing' that was not possible prior to to the encounter (2001). Through a train journey, Schivelbusch (1986)'s reveal how the coupling of the human and train connected the traveler to new mental and bodily forms of a new subject 'panoramic observer' beyond the object 'train' (Pickering, 2001). This post-humanist account, although centered on the human subject, is an invitation to go beyond the visible encounter of the human and the material to understand what is it that drives phenomena to emerge. What are these emergent material properties that are not visible nor present at the time of the coupling of the human and the material? (DeLanda, 2006; Deleuze & Guattari, 1987). How can we attend to this discontinuous emergence (Schatzki, 2001) that challenges gradual enactments when tinkering (Knorr Cetina, 2001), using (Orlikowski, 2000), or being entangled with the material in strategizing practice (Barad, 2003, 2007)? A good starting point is to admit the unstable character of the unit of analysis that transcends the context of strategizing practices (Pickering, 2001), and problematize the notion of strategizing practice and its ability to explain the relationship of the material and the human and ensuing phenomena (Pickering, 2001). Mechanistic causation cannot explain this emergence for its own push and pull mechanisms account for predictable results but cannot tell if these results would amount to any order (Short, 2007).

It is this unpredictable order that we seek to explore through a different account of the material as an emergent real whose ideal shapes its actual. Causality, for us, is teleological, and destitute of agency because, on Peircean grounds, relations between signs take the forms of cause and effect, and therefore agency, social order, and emergence permeate all existence (Peirce, 1994; Rosiek & Snyder, 2018). This universality is what we seek to import to the debate in SAP about the status of the material for it allows to see the material as both the effect and the cause of responses to the patterns in phenomena that illicit further reactions, which become patterns in an ad infinitum generation of a complex relatedness of signs somewhat akin to sociomateriality's entanglement of all bodies in intra-activity (Rosiek & Snyder, 2018). What interests us in Peirce's semiotics is the ontological substance he gives to these responses to temporal patterns in phenomena which accord a form and purpose to agency (Rosiek & Snyder, 2018) contrary to agential realism that brushes over the possibilities (causes and effects) of agential cuts, which leaves agency floating in the realm of intra-activity. According to Peirce, these responses are habits (human or non-human) that anticipate future possibilities that shape the becoming of their meaning (Short, 2007). For instance, the tendency to write with a pen shapes its materiality in the same way the tendency of producing a palm tree shapes the material form of a palm tree seed (Rosiek & Snyder, 2018). To go back to Knorr Cetina (2001)'s notion of epistemic practice, she differentiates between epistemic and habitual work by giving the latter the deterministic nature that functions when ritualized and in equilibrium with its environment, and ceases when disrupted. In contrast, epistemic practice has an alien element to it that is the 'thing' itself and its relation to the subject because there is no epistemic practice without epistemic objects and without understanding the unfolding relations between subject and objects one cannot fathom epistemic practice (Knorr Cetina, 2001). For us, the alien is the agency of epistemic practice, and therefore we adopt Short (2007)'s term agential

phenomena instead of epistemic practice to emphasize that when disruption arises the doings of strategy have two paths to follow: if it is deterministic and mechanical, it awaits external intervention to swing back to equilibrium akin to Knorr Cetina's car example that when it breaks, it ceases to function until an expert intervenes. However, creative strategizing practice is never deterministic and mechanical, therefore an agential phenomenon, and in response to disruption, will get back to equilibrium by reorganizing itself around its tendency of becoming; its '*esse in futuro'* (Short, 2007).

The material as emergent real

To view the world through mechanistic causality means to bracket the ends for which the entity exists, ascribing the ends out of which the entity comes to be (Kohn, 2013). For instance, a computer *is* in sofar as it *is* here to serve something for its user. The new materialists' indiscriminate treatment of the human and the material cuts off representation and leaves agency unexamined (Kohn, 2013). As a corollary, relationality for Latour relies on "actant" (Latour, 1987) and on "intra-activity" for Barad (2003, 2007) and Haraway (2008), and on "chain of wantings" for Knorr Cetina (2001). All these relational concepts stem from human language properties and when extending it to the non-human it projects humanlike attributes such as intra-activity onto the material and hence obscure the properties that govern the relationality of the material and confound its agency with its resistance to representation, which re-inscribes the material/human dualism because it is only a factuality that any entity can be subject to representation or resist it (Kohn, 2013). Excluding telos and intentionality as forms of agency re-inscribes a dualism in which the material stands-in for the human, i.e., an agentified material and an obtuse human and therefore conflating resistance with agency (Kohn, 2013). Conceptualizing relationality as a Peircean semiotic process escapes this trap because it decenters the Cartesian cogito from the human and

his mind and houses it in the universe of signs thus allowing for non-linguistic representation with no humanlike assumptions because Peirce's signs do not reside in things, bodies, or minds, but are continuous processes of relationships through which they come to be (Kohn, 2013). They are alive in sofar as they can grow and can be interpreted by another ensuing sign 'interpretant' in a living semiotic process that extends beyond the actual present (Kohn, 2013). Within this semiotic chain, signs do not exist only now but also in the potential's parenace (Kohn, 2013). Peirce's interpretant is 'the proper significate effect that the sign produces' (CP 5.475), and does not reside in the mind but in the elements of the world as a potentiality, a reaction, or a change in habit (Crossland & Bauer, 2017). For instance, a server built to store structured data is an interpretant of the capacity of data to be structured and stored. Big data analytics built to structure and analyze data is an interpretant of an expected future collection of data. Peirce's interpretant is like Gibson (1979)'s concept of affordances in sofar as it discontinues interpretation from the subject, and by extension its cognition, and projects it into the human and material practices (Crossland & Bauer, 2017; Pickering, 2007). It is the subsequent vitality, materiality, and action that make signs produce the mind rather than come from it (Kohn, 2013). The mind itself is no longer the black box that interprets signs but is the product of the semiotic chain, and is ephemeral for it "comes to life" only to be the temporary locus for the interpretant (Deacon, 2012; Kohn, 2013; CP 5.421).

Peirce's semiosis does not limit materiality to the mediation between the human and the material, but opens it up to a world of possibilities that does not assume its ontology or that of other signs' relations (Crossland & Bauer, 2017). Accordingly, each sign produces another in an endless, processual, and dynamic chain of relationships between signs (Crossland & Bauer, 2017; Keane, 2003; Queiroz & Merrell, 2006). This processual dynamism is what can account for the historicity and contingency of the material as a sign without reducing it to the human context of discourse

and linguistic representation, nor does it restrict it to a mediative role (Keane, 2003). It dissolves the dualism between the human and the material for it views causality and thought as semiotic (Pickering, 2007) and therefore stretches the new materialist and post-structuralist accounts beyond performativity without discarding representation (Crossland & Bauer, 2017). In this vein, representation is broader than the grammatical sense in sofar as it deals with instances rather than with synonymous or definitions (Nöth, 2011). Its verb "to represent" is trivalent rather than bivalent in the sense that it involves three correlates: a sign (representamen) "stands for something" (a represented object) to "somebody in some respect of capacity" (an interpretant) (Nöth, 2011; CP 2.228). For instance, a strategy map represents the strategy of an organization to "the conception of them who understand it" (W2.54; CP 1.553). Representation is a triadic relationship where A represents B to C and exceeds any dyadic relationship whereof language represents things (Nöth, 2011). It subsumes Kant's inward representation (mental thoughts) and expands to account for outward representation 'external signs' (Nöth, 2011). It ascribes to thoughts and external signs the same status of a sign in the semiosis process (Nöth, 2011). Every thought is a representation (sign) of an antecedent thought (object) and produces another thought (interpretant) in the mind (W 3.62-63). This representation beyond symbolic representation pushes us to recognize that although our contexts (language, history, culture, society) are in fact a product of the symbolic, our world surpasses these symbolic contexts, and therefore elicits a different representation that is neither a human affair nor language-like (Kohn, 2013). Language, the human, and the symbolic are no longer a matter of the thought process (Kohn, 2013) for thinking and representation are in the world beyond the confines of the human, the mind, and life itself and therefore we need not to order them to our cognitive or symbolic structures because agency is in

the human and non-human worlds and is not connected through cause and effect but through 'that which' drives its folding direction (Kohn, 2013; Bruno Latour, 2014).

This connector is semiosis or experience, a non-deterministic inclination, a generative tendency toward an ideal form that connects agents (Rosiek, 2018), or as Latour (2014) puts it: the French word 'sens'. If we were to reposition a vector that has a horizontal direction to the right (keeping the vector the same by not rotating it), the vector can have a multitude of directions but only two inclinations: above or below the horizontal direction to the right. This inclination is what Latour (2014) means by 'sens' and what stands as the universal connector between the human and the material entities of life (Kohn, 2013; Bruno Latour, 2014; Rosiek, 2018). For instance, an office space has a tendency to organize strategy practitioners into the general form of a workshop, though the actual workshop will be a response to the interaction between the office space and the conditions imposed by the participants. Big data analytics has a tendency to organize data into a certain form of patterns, although the actual pattern data will take will be an outcome of the interaction of data and the human monitored analytical variables. Preexisting relata do not determine this ontological directionality, but it materializes through its 'esse in futuro' as a possibility that shapes its actual mode of being (Peirce, 1998a; Rosiek, 2018) and agency (Rosiek, 2018; Short, 2007) because reducing agency to effects shared indiscriminately by the human and the material through their mutual entanglement in intra-actions confers humanlike thought properties upon the material and overlooks the minutiae, particularities that distinguish the arbitrary sign from the non-arbitrary modes of reference (Kohn, 2013). An office space is as much about what is inside the walls as it is about the absence they delimit. So certain strategizing practices depend on what the office space *is* as much as all excluded absences that it *is* not (Kohn, 2013). This absence, nothingness is immaterial, invisible, and constitutive of the semiotic process,

akin to the wheel metaphor of Lao-Tzu that is useful thanks to the hole at its hub (Deacon, 2012; Kohn, 2013). It is this constitutive absence at the hub of the wheel, delimited by its spokes, that causes all the practices of the wheel (Deacon, 2012). This constitutive absence is not a material quality, it is a relation to a real which is not here as opposed to a real that is out there, which ignores the spontaneity of life, its tendency to emerge, not to mention its semiosis in which we (humans and non humans) are nested (Bateson, 2000; Deacon, 2006; Kohn, 2013)

Limiting the real to what happens re-instigates the possibility of life into the mind, and does not account for how this mind could have emerged out of semiosis nor does it account for how it relates to the semiotic chain in the human and the material realms (Kohn, 2013). This real is what Peirce names "secondness" (CP 1.23, 26). The apple bonking Newton's head is secondness in sofar it is a "shocking" (CP 1.336), "brutal" (CP 1.419), event that disrupts our habituality and pushes us to think differently (Kohn, 2013; CP 1.336). However, Peirce does not limit realism to secondness, but leaps over it to a much broader realism that could encompass his semiotics and therefore a non-dualistic view of our existence in relation to spontaneity and emergence (Kohn, 2013). The realism that could accommodate the human and non-human and account for how the former emerges from the latter (Kohn, 2013). He devises a triadic realism of which secondness is only one aspect. Firstness is the aspect that involves raw spontaneity, quality, feeling, in a vacuum, detached from anything else (Kohn, 2013; CP 1.304), whereas thirdness attends to the world's "tendency to take habits" of all entities in the universe, the tendency to having patterns, purposes, and regularities (Kohn, 2013; CP 1.409; CP 6.101). It does not occur in the mind, nor is it imposed by it; it is innate in the world: the generality that conditions semiosis (Kohn, 2013). In the doings of strategy with 'stuff', form patterns proliferate to an unprecedented degree in all directions, yielding what Boyd and Crawford (2012) refer to as apophenia, i.e., seeing patterns where absence

prevails. Form here is not a synonymous of structure or domain, but is a process of pattern production and propagation whose innate generative logic comes to permeate the human as they harness it (Latour 2014; Deacon, 2006, 2012; Kohn, 2013). These patterns are significant in their absence, akin to the dog that did not bark whose silence helped Sherlock Holmes solve the mystery of the race horse that had disappeared. During the investigation, the inspector asks Holmes whether there is anything that drew his attention to which Holmes replied: "the curious incident of the dog". The inspector replied: "the dog did nothing that night" Holmes: "that was the curious incident … I had grasped the silence of the dog for one true inference invariably suggests others … obviously the midnight visitor was someone the dog knew well" (Doyle, 1894: 19–23). Floridi (2012) suggests that when these patterns are absent, that is probably also a curious incident akin to when data did not bark prior to the subprime crisis of 2007-2009.

This form is a difficult notion to attend to because it is ephemeral and hidden from our standard modes of inquiry, and does not have the tangible otherness of any ethnographic project, nor does it fit the dualistic metaphysics that steers us into seeing causality as either a matter of push and pull mechanisms or of desires or cognition of the human (Kohn, 2013). Form propagates itself through the human and affects the logic of strategizing from within and accessing it requires entering the logic of these patterns (Kohn, 2013). For instance, big data falls into form when aggregated from its unstructured messiness, yet aggregated data flow into strategizing activities to point to reality beyond them at the price of compromising the rich and complex distributive data that high abstraction overlooks and therefore conveys dubious descriptions of reality (Constantiou & Kallinikos, 2014). Seeing distributive data does not imply a shift of perspective but the ability of seeing form 'twice' for both aggregate and distributive data are two dimensions of the same entity: one is the inside of the other; either explains the other (Coutin, 2002; Riles, 2000).

Therefore, the phenomenon at hand is not "outside" that is endemic to our encounters with material practices of strategizing, but is inherently "inside" the absent patterns of strategizing practice (Riles, 2000). Therefore, the forming patterns of strategizing practice are the effects of self-organizing selves (Deacon, 2006, 2012) and to practice strategizing on the terms of these form patterns, to enter their relational logic, to account for their constitutive absences, post-humanist SAP shall become attuned to their existence and self-organizing nature and attend to render these self-organizing selves accessible from within, that is turning the patterns inside out akin to finding a vantage point from which to attend to what seems too familiar to apprehend (Kohn, 2013; Riles, 2000). Our semiotic view of the doings of strategizing re-conceptualizes causality through form and theorizes agency as a product of an absential and shared 'form' between the human and the material whereof the constitution of the doings of strategy ensues (Kohn, 2013). This form is neither cognitive nor material; it is an absential pattern that result from constraints on possibility (Kohn, 2013). Therefore, the aim of future materiality and SAP studies shall be the flushing out of this constitutive form (Kohn, 2013) bringing to fore how its constraints on possibility emerge in the doings of strategy with 'stuff' and the particular manner its patterns propagate and the ways whereby they come to matter to the practitioners of strategy (Kohn, 2013). If we were to display in front us all the patterns generated by big data analytics and were to make a sketch of the forms generated by the holes between these patterns, we could enact a new figure made by the absent shapes that the spaces between the patterns have generated. These absent shapes are what the material turn in SAP studies shall seek to enact by turning the patterns of form 'inside out' (Riles, 2000).

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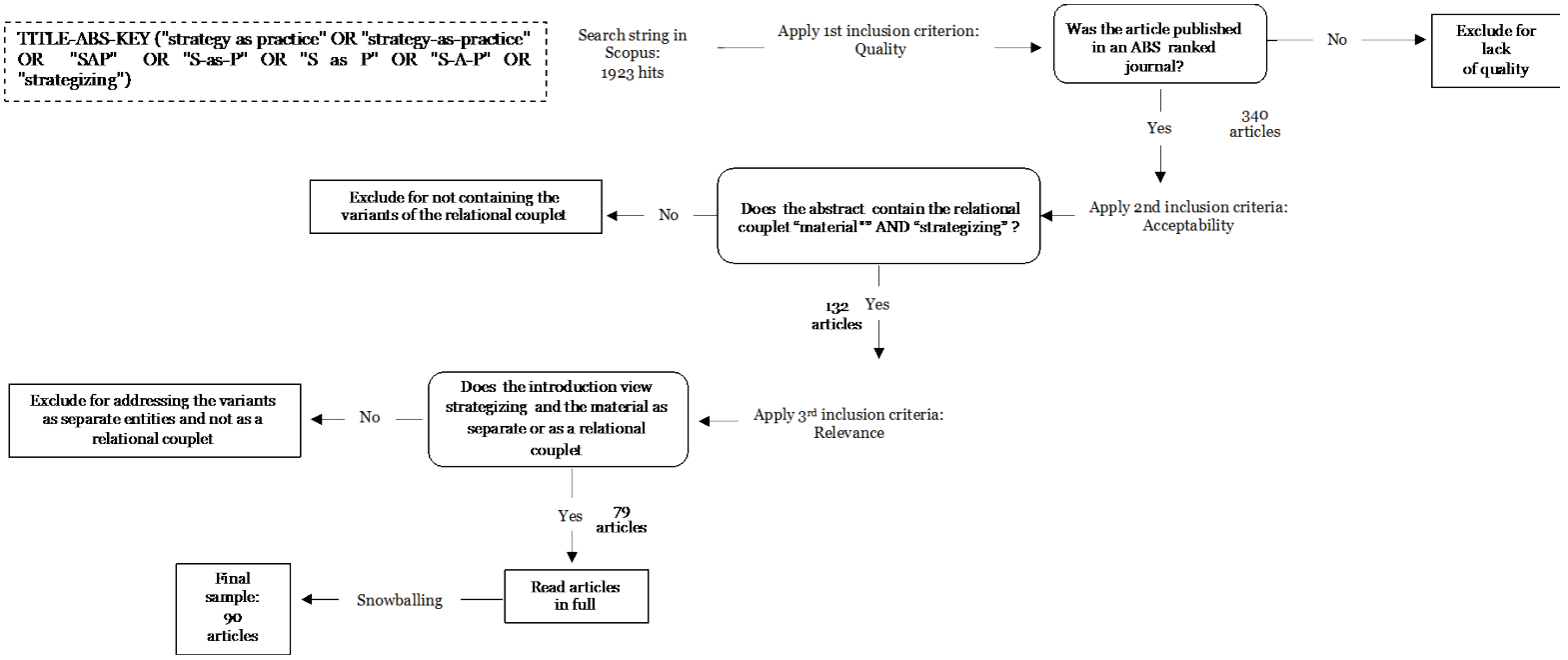

Figure 1. Summary of paper selection process

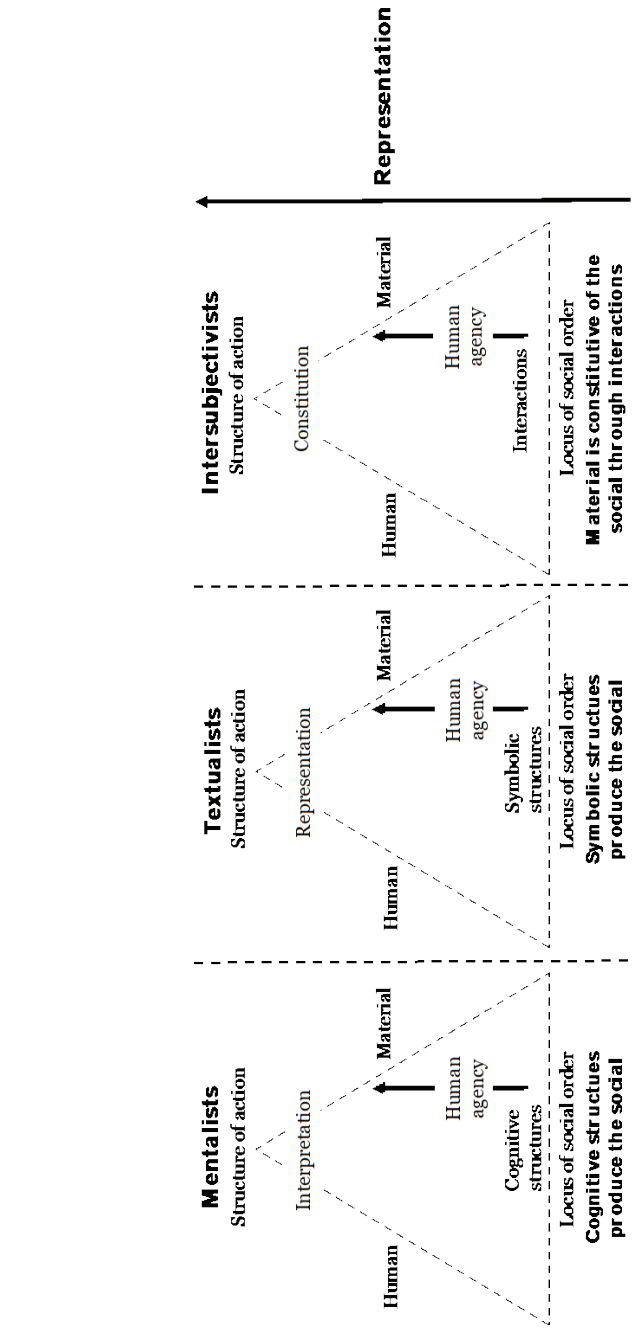

Figure 2. The status of the material following humanist asymmetry

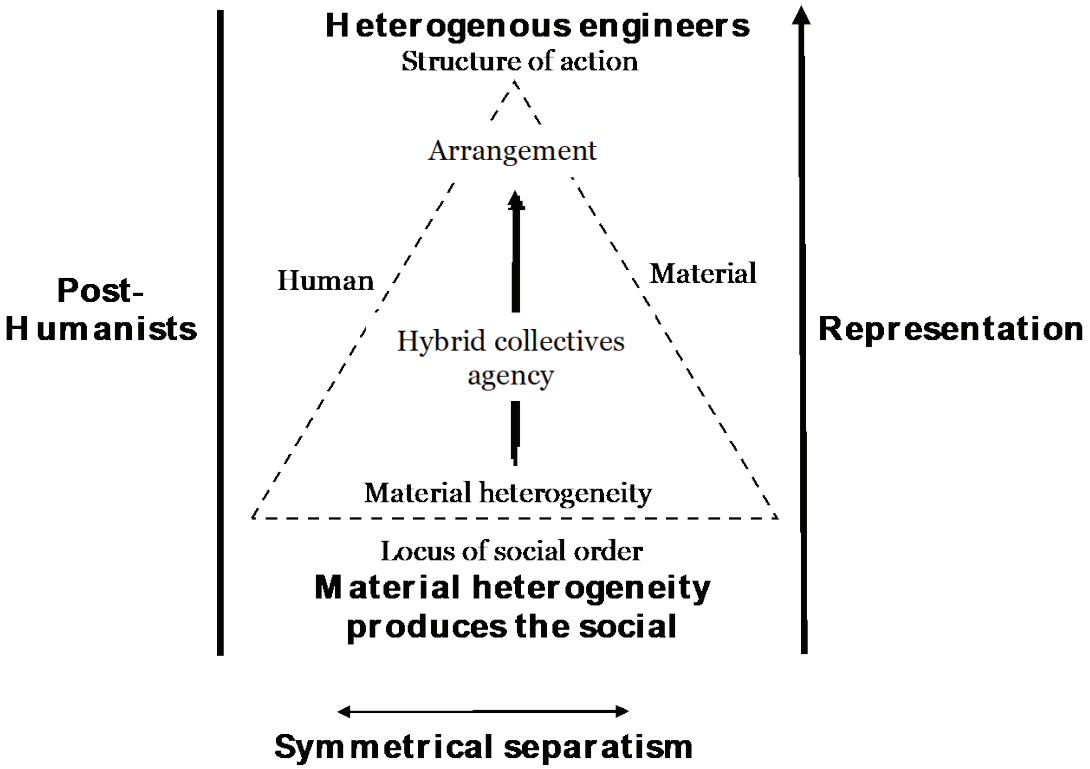

Figure 3. The status of the material following post-humanist symmetry

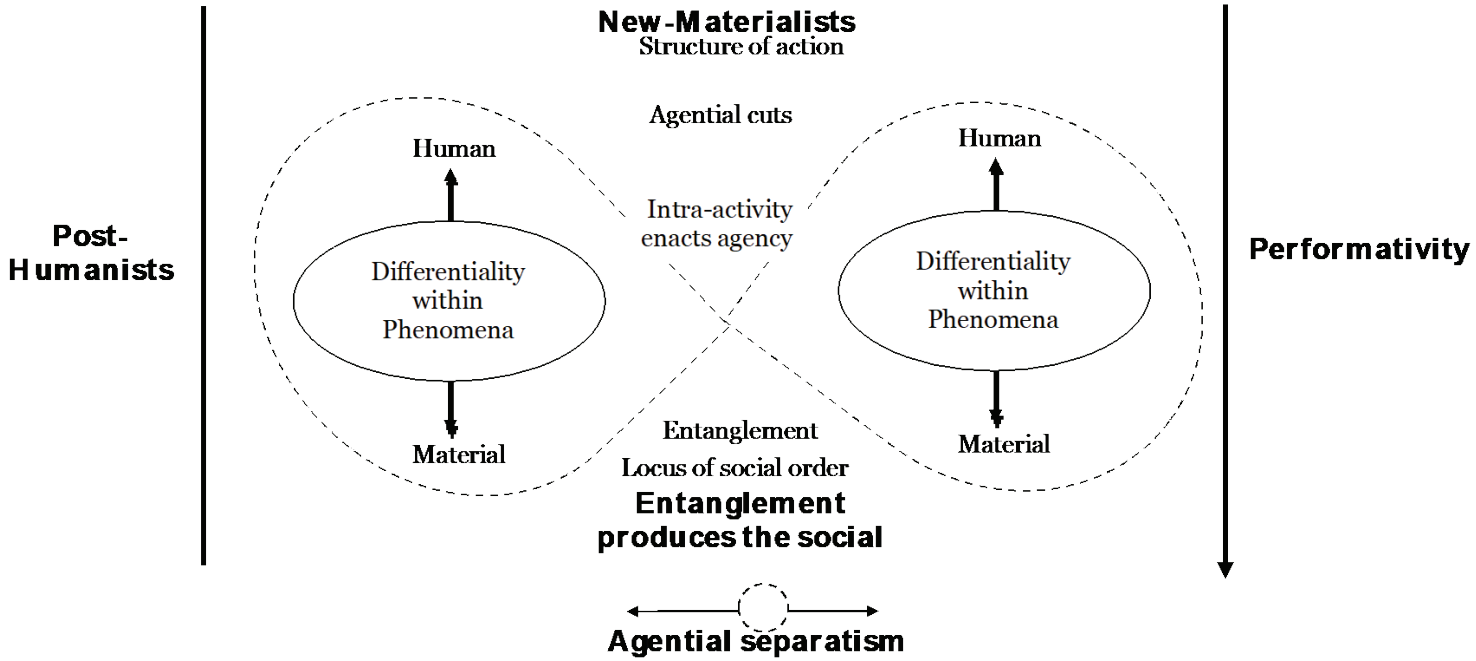

Figure 4. The status of the material following sociomaterial entanglement