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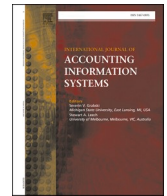
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Controllers' role in managerial sensemaking and information trust building in a business intelligence environment

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ABSTRACT

This study explores how an organization's controllers (management accountants) give sense to the information provided by its business intelligence (BI) system, and thus shape the construction of information trust. A qualitative case study was conducted within a Finnish food manufacturing company, building on the notion of trust related to management accounting information and sensemaking theory. The study was informed through open-ended interviews and an examination of internal accounting and management reports. The authors found that the company used an integrated BI system that enabled the production of information in a timely and perceivably standardized manner. Controllers managed this accounting information and gave sense to it, helping deliver a shared understanding of the daily business situation. The findings show that controllers play a pivotal role in building information trust by giving sense to the information provided by the BI system.

1. Introduction

Management accounting scholars have discussed *trust* as a necessary element in the greater use of accounting information in an organization (Bisbe and Sivabalan, 2017; Busco et al., 2006; Hartmann and Slapničar, 2009; Hyndman and McConville, 2018; Johansson and Baldvinsdottir, 2003; Long, 2018). Scholars have examined trust as a research topic in several ways. From a psychological perspective, Kramer (1999) noted that fundamentally different conceptions of trust could be derived from literature depicting trust as a rational choice, as opposed to promoting trust as a more relational and psychological concept. Trust can be seen as a psychological state comprising the intention to accept vulnerability based on positive expectations of the intentions or behavior of another person (Hyndman and McConville, 2018; Rousseau et al., 1998; Schoorman et al., 2007). In the accounting literature, Busco et al. (2006) present trust as a mechanism that can reduce uncertainty in a social interaction (relationship) context and facilitate the function of an organizational process. The same study further stated that trust could be interpreted as risky engagement, where someone (the trust subject) has trust in someone or something (the trust object) in some respects and under certain conditions (context).

Trust may encompass both (inter)personal and material aspects, such as trust in individuals (e.g., information producers) and trust

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in accounting systems (Busco et al., 2006; Robalo and Gago, 2017). Moreover, trust can involve multiple actors[1] (called the trustor and trustee) and their relationships, while the context or situation (see Kramer, 1999) and both rational (or calculative practices) and relational (or subjective) aspects also influence the formation of trust (Kramer, 1999; Robalo and Gago, 2017). This study builds on this stream of literature to explore how trust in accounting information provided by an integrated business intelligence (BI) information system is affected by the sensemaking of information users, and to investigate the sense-giving efforts by the producers and mediators of accounting information, management accounting professionals (controllers).

Weick (1993, 635) considers that the basic idea of sensemaking is that "reality is an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs," making it a process that provides meaning to experiences, socially and personally, within frameworks of roles, rules, procedures, and authority relations. Reliance on past experiences and practices facilitates the creation of meanings, but the meanings and frameworks are not stable or independent as "meanings affect frameworks, which affect meaning" (Weick, 1993, p. 645).

Sense-giving, in contrast, is the "process of attempting to influence the sensemaking and meaning construction of others toward a preferred redefinition of organizational reality" (Gioia and Chittipeddi, 1991, p. 442). Sense-giving focuses on influencing the sensemaking of *others* by conveying the desired perception of reality, for example, from accounting information. Sense-giving is usually studied in terms of how individuals attempt to shape sensemaking in organizations using symbols, images, and other techniques (Gioia and Chittipeddi, 1991; Maitlis and Christianson, 2014). However, actors at any level of an organization may engage in sense-giving with others (Maitlis and Lawrence, 2007). This study examines the role of controllers in giving sense to the information they process and supply to managers and other decision-makers in the organization.

Prior management accounting studies reveal little about how accounting information produced by an integrated information system, such as a BI system and controllers' involvement in the process (Rikhardsson and Yigitbasioglu, 2018), affects managers' perceptions of trust in accounting information in an organization. Furthermore, there is little evidence of how such information trust relates to organizational members' use of that information. These two gaps in prior research warrant detailed investigation because the organizational use of BI has recently become widespread. Business information systems are applied to accumulate and analyze data and deliver useful information to executives and operational managers to aid informed, collective business decision-making (Goretzki and Messner, 2016; Moll and Yigitbasioglu, 2019; Rud, 2009; Wixom and Watson, 2010). We seek to contribute to the literature by addressing the following research question in a case setting:

> How do an organization's controllers (management accountants) give sense to the information provided by its business intelligence (BI) system and thus shape the construction of trust in accounting information?

Information trust has primarily been studied through experiments and archival databases (Iding et al., 2009; Rowley and Johnson, 2013). We contribute to the extant literature by utilizing a qualitative research design that involves interview data and documentary records. We explored the role of controllers in producing and moderating information that supports trust in various operational and strategic decision-making situations. In a case setting, sensemaking relates to organizational members' interactions in sharing and interpreting information through shared beliefs, individual attitudes, and perceptions (Argyris and Schon, 1978; Lye et al., 2021). This interaction highlights the relational side of trust within internal organizational relationships. The case study of a Finnish food manufacturing company presented in this article contributes to the accounting information systems and management accounting literature by showing how controllers' information management related to management accounting information (filtering, managing, verifying, editing, reporting, and oversight) helps build trust in, and gives sense to, accounting information provided by the BI system (with elements of both financial and management accounting information systems).

Our longitudinal empirical data from a Finnish company illustrates accounting information trust from the user perspective, focusing on the sensemaking of the information produced. Research also highlights how controllers' sense-giving capabilities build trust in accounting information, resulting in users valuing the relevance of the information to managerial decision-making. Furthermore, our findings offer managerial implications for practitioners on how accounting information trust depends on individuals' filtering and making sense of the data and decision-making context. Finally, organizations worldwide could learn from our findings on how controllers (management accountants in various positions) play important roles in the organization, acting as sense-givers when producing high-quality and relevant information.

The remainder of this paper is organized as follows. Section 2 reviews the literature on information trust and BI systems. Section 3 discusses the notion of sensemaking and highlights its connection with information trust. Section 3 also illustrates, theoretically with regard to information characteristics, how plausibility of information may be valued over accuracy by users of information in sensemaking theory. The positioning of this study at the intersection of information trust, BI, and sensemaking enables us to explore how individuals' trust in accounting information is constructed and used in organizational sensemaking. Section 4 discusses the research design and methods applied. Section 5 presents our empirical findings and analyses. Section 6 presents a discussion, and the final section concludes the paper.

2. Information trust and BI systems

This study uses the term trust in the context of an organization's integrated information system to refer to "the degree to which the

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[1] In this paper, actors, people, or individuals are used interchangeably to refer to employees at any level of an organization.

individual (trustor) has a positive view about the technology in terms of the technology being used in the individual's best interest" (Petter et al., 2013, 16). To perceive that information (the object of trust) is reliable or makes sense, information users (trustors) need to trust the information source (the accounting information system) and its producers (trustees) (Robalo and Gago, 2017; Rowley and Johnson, 2013). Accordingly, information trust reflects the confidence of the decision maker or data analysts in interpreting the information and competence of the information provider (Hertzum et al., 2002; Kelton et al., 2008; Robalo and Gago, 2017; Rousseau et al., 1998).

We conceptualize trust in information on the part of the trustor as *information trust*. We define it as a situation where the information user has confidence that the information used is *reliable* and thus enables making sense of cases. Second, the user has a positive expectation regarding the intentions of the stakeholders involved in creating that information. Further, in an accounting context, information is expected to be relevant, to inform decisions and reflect a true and fair view (Barth et al., 2001; Hines, 1988; SFAC 8, 2010). Business intelligence is a *"broad category of technologies, applications, and processes for gathering, storing, accessing, and analyzing"* business data (Wixom and Watson, 2010, p. 13). A BI system includes dashboards, visualizations, productive analytics, and data-mining tools, which can facilitate the interpretation of data to create a competitive edge for a business (Rud, 2009). Nevertheless, as is typical of accounting information systems in large organizations, BI offers mediated communication (e.g., Weick, 1993, p.644), where some members (e.g., controllers) of the organization utilize reports from the system to inform other members of the organization.

In the era of big data[2], large volumes of data and information of varying quality (and trustworthiness) are available to decision-makers from multiple sources (Rowley and Johnson, 2013). Consequently, accounting and BI tools can help managers and other stakeholders understand business and market information and make better decisions (Chen et al., 2012; Davenport, 2010; Nykänen et al., 2016).

However, even today's advanced BI and IT systems are affected by data-quality issues (Appelbaum et al., 2017; Dahlbom et al., 2020; Nykänen et al., 2016). Further, sources of information for data analysis include multiple instances such as people, documents, information technology (IT) systems, and reports (Birnberg, 2011; Hall, 2010; Hertzum et al., 2002). The large volume of information from different sources can challenge the information user trying to make sense of the data because the level of information trust can vary depending on the source of information.[3] Quattrone (2016) notes that if the system generates information, the data analyst or decision-maker may not know the reasoning behind the analysis (Quattrone, 2016). Technology changes can thereby affect the trustworthiness of accounting information and the need for and legitimacy of traditional professional groups to analyze and verify that information (Moll and Yigitbasioglu, 2019).

The literature depicts trust as a complex and multidimensional concept (Beldad et al., 2010; Berry et al., 2009; Busco et al., 2006; Free, 2008; Johnson et al., 2015; Lewis and Weigert, 1985; Robalo and Gago, 2017). Tomkins (2001) noted that information is needed when there is moderate trust in the relationship; the greater the extent of personal-level trust, the less accounting information is required. The relationship between interpersonal trust and accounting or control systems has frequently been studied (Bisbe and Sivabalan, 2017; Hartmann and Slapničar, 2009; Long, 2018). However, trust in accounting information remains a scarcely studied area. Jeacle and Carter (2011) studied systems trust in the context of a travel expert system (TripAdvisor). The study revealed critical issues, including the dynamics between experts and users and the importance of trusting the system. The findings also connect to the accounting profession's reputation as a trusted provider in capital markets, as Barrett and Gendron (2006) point out.

Accounting systems in an organization involve several accounting professionals in various roles: preparing and using statements, personnel implementing, supervising, controlling the systems, and verifying the information. In addition, such accounting information systems (AIS) help management accountants utilize business analytics, conduct performance measurements, and provide other decision-related information, such as planning and data analytics (Appelbaum et al., 2017).

The current research focuses on supervisory management accounting professionals, called controllers or business controllers in our case organization. Robalo and Gago (2017) theorize that accounting professionals play an integral role in mediating trust in the information produced. Accounting professionals may, therefore, act as information filters, ensuring that non-critical data are not addressed, thus adding focus (Goretzki and Messner, 2016), acting as trust providers or trustees (Barrett and Gendron, 2006; Kramer, 1999; Robalo and Gago, 2017), and as actors in the process of creating accounting information trust (Huikku et al., 2017). Johansson and Baldvinsdottir (2003) found that "trusting accountants as well as trusting accounting figures is necessary if the information concerned is to be used for evaluating performance in a way that will improve organizational performance" (p. 232).

The literature on trust has rarely addressed information quality or the role of accountants in producing such quality or trustworthiness. Nevertheless, a broad understanding of the concept and typologies of trust could help us understand trust (Robalo and Gago, 2017), so the process of creating trust, in our view, merits attention. Robalo and Gago (2017) note that trust can emerge from contracts between trustors and trustees (contractual trust), competence, and goodwill; however, further research is necessary to unveil

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[2] Big data refers to the "vast amount of data continually collected through devices and technologies such as credit cards and customer loyalty cards, the internet and social media and, increasingly, Wi-Fi sensors and electronic tags" (Langfield-Smith et al., 2018, 9).

[3] In general, trust implies the expectation that actors have of someone or something (Lewis and Weigert, 1985; Free, 2008). In the accounting context, "accounting information trust" involves various sources of information: assumptions about the company's future, its employees, management and controllers, and accounting and management control systems. Further, the financial accounting principles and systems, in the country and in the company, need to be trusted, especially under the (future-oriented) going concern assumption, affecting for example asset valuations. Moreover, financial information is verified or audited by additional experts, such as auditors, another group of accounting professional involved in the social construction of accounting information trust..

the role of trust in adopting accounting innovations and that of various parties and actors in trust processes. It has also been suggested that the relationships among trust, information quality, and information use (relevance) warrant further research (Mättö and Sippola, 2016; Rowley and Johnson, 2013). Wang and Emurian (2005) found that individual and situational characteristics, such as an organization's BI system, affect trust. In this context, the producers of information (accountants) and controllers play important roles in creating accounting information trust within an organization. These roles may include filtering information from the data to identify events requiring collective judgment (or collective sensemaking) and calculative reasoning. Controllers may also assess which events can be left unaddressed in the relevant situation (Goretzki and Messner, 2016).

We expect that the controller's information management role (filtering, managing, editing, reporting, and oversight) may enhance the reliability and plausibility of management accounting information, potentially leading managers to increase their use of such information. This effect is expected to be more intense when controllers are familiar with business processes and can interpret the data (Granlund and Lukka, 1998; Appelbaum et al., 2017; Järvenpää, 2007; Robalo and Moreira, 2020). In this case, they can serve as legitimate trust providers (Barrett and Gendron, 2006). Hertzum et al. (2002) report that the information source (information producer) is not always willing or able to convey trustworthy information to the information seeker (decision-maker). To the information seeker, "trust involves an assessment of whether the other person possesses the required knowledge and skills (does he/she know?) and is likely to give a truthful and unbiased account of what he/she knows (will he/she tell?)" (Hertzum et al., 2002, 577). Further, a decision to trust requires that the information seeker can "interpret the communicated message (do I understand?)" (Hertzum et al., 2002, 577). This is closely related to the sensemaking aspect of the information. The findings section illustrates the process of interpreting, or sensemaking, the various elements pertaining to trust in management accounting information in the case context. Next, the notion of sensemaking is presented as the key interpretative method theory (Lukka and Vinnari, 2014) applied to analyze individual-level issues, such as the role of controllers in creating trust in information produced through sense-giving or how decision-makers make sense of information in the organization.

3. Sensemaking theory

Weick (1993) states that "The basic idea of sensemaking is that reality is an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs" (p. 635). In organizational studies, sensemaking has been used when focusing on the cognitive activity of framing experienced situations as meaningful (Maitlis and Christianson, 2014). In other words, sensemaking is concerned with making things that have already happened subjectively meaningful (Boland, 2008). Sensemaking can also be directed to the future and is then described as prospective sensemaking (Patvardhan et al., 2018). Finally, collective sensemaking is a collaborative process of creating shared awareness and understanding from different perspectives and interests (Weick, 1995). Collective sensemaking occurs when organizational members construct, interpret, and recognize meaningful features of the world (Maitlis, 2005; Maitlis and Christianson, 2014). While sensemaking involves managers' understanding and interpretation of the information around them, related processes of sense-giving are concerned with attempts to influence the outcome of sensemaking by communicating sense-givers' thoughts on the information to others (Gioia and Chittipeddi, 1991; Rouleau, 2005). Rouleau (2005) notes that while these processes appear to differ conceptually, their boundaries overlap and involve the same phenomenon where organizational members engage in social interaction to make sense of what has occurred. To understand the construction process of information trust and its influence on organizational sensemaking, we used the notion of sensemaking at the heart of our theoretical framework.

Weick (1995) states that sensemaking has seven properties: *identity, retrospection, enactment, social activity, ongoing, extract cues,* and *plausibility over accuracy*[4]. Identity requires people to think about who they are in a specific context, shaping what they enact and how they interpret different events. Therefore, sensemaking is grounded in identity construction (Maitlis and Christianson, 2014). The concept of retrospection provides an opportunity for sensemaking: the point of retrospection in time affects what people notice. People enact the environments they face through dialogue and narratives. Speaking helps people understand what they think, to organize experiences, and control and predict different events, thus reducing complexity. Weick (1995) stated that sensemaking is also an ongoing social activity, and plausible stories are preserved, retained, or shared. Organizational members simultaneously shape and react to different situations. Weick (1995) also stated that people extract cues from the context to help them decide whether the information is relevant and which explanations they consider acceptable. Moreover, people tend to favor plausibility over accuracy in accounts of events and contexts. According to sensemaking theory, these seven aspects interact and are intertwined in individual interpretations. The same theory also holds that sensemaking can be observed through narratives (Maitlis and Christianson, 2014; Weick, 1995).

Sense-making has been increasingly studied in accounting systems and BI research. Early works include Boland and Pondy (1983), Boland (1984), and Jönsson (1987), and newer ones include Jordan and Messner (2012), Puhakka (2017), Sajasalo et al. (2016), and Tillmann and Goddard (2008). These studies have focused on how accounting is used in sensemaking in various contexts. For example, performance measurement systems may be used for rationalization, retrospective sensemaking, legitimation, and maintaining or reconciling techniques and skills among organizational units (Cooper et al., 2019). Tillmann and Goddard (2008) studied strategic management accounting and found that accounting can contribute to strategic management through sensemaking. Management accountants consciously and unconsciously undertake sensemaking activities to understand strategic situations and construct meaning

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[4] The plausibility property of sense-making is defined by Weick (1995, 62): "I need to know enough about what I think to get on with my projects, but no more, which means sufficiency and plausibility take precedence over accuracy".

for themselves, thus influencing the sensemaking of other organizational participants. Tillmann and Goddard (2008) found that sensemaking occurs through structuring, harmonizing, bridging, contextualizing, compromising, and balancing strategies. Jordan and Messner (2012) found that managers apply sensemaking when facing incomplete performance measures and use management control systems (MCSs) to facilitate sense-giving.

Herschel and Jones (2005) and Herschel and Yermish (2009) studied the impact of sensemaking on culture and trust in the adaptation to and use of BI. Namvar (2016) investigated how BI can improve the process of organizational sensemaking that facilitates decision-making. Business intelligence can assist in organizational sensemaking when a BI identity is created at both the corporate and individual levels. This identity can be developed through the continuous process of enactment in the BI environment by the end-users of BI. Enactment results in a clear definition of the BI scope with organizations and an understanding of business data by end-users. In this case, business intelligence system end-users must collaborate with various BI stakeholders (including data analysts) and directly interact with BI tools to explore and act on relevant BI reports.

This study explicitly addresses the sensemaking shaped by the controllers in charge of information management; thus, these controllers become sense-givers for the information produced. In our case, the BI system provides the context in which the information is produced. In other words, controllers are important sources of information. Our analysis exposes the two-way relationship between trust and sensemaking. How individuals perceive information affects their use of that information in sensemaking, although their perception is not always conscious. Some information may be regarded as more plausible or trustworthy and used when individuals and groups identify cues when making sense of different events.

Nevertheless, individuals' sensemaking is also based on the extent to which information assists sensemaking. In this sense, the challenge for accountants will be to determine which information is most important for decision-makers and "to communicate this critical information to these decision-makers in a way that can be easily understood" (Langfield-Smith et al., 2018, p. 9). Therefore, it is essential to note that individuals' sensemaking depends on both the perceived quality of information and the ability of the sense-givers to provide plausibility for the information (Maitlis and Lawrence, 2007). We sought to understand this vital phenomenon using empirical evidence from a Finnish organization.

4. Research site, design, and method

4.1. The research site

The research site for this study was a Finnish food producer. It is the largest subsidiary in this group. This group operates internationally in several countries, including Sweden, Russia, and Estonia. At the time of the study in 2015, the annual turnover of the subsidiary was approximately EUR 945 million. However, in recent years, the turnover trend has shown a slight decrease. The subsidiary has more than 2000 employees and is responsible for the group's Finnish operations through four major production plants in Finland. The firm's customers include retailers, catering services, industry, and export trade. The group's headquarters is in Finland, but its subsidiaries have expanded to control several well-known national brands in different countries. In addition, the group has bought and sold subsidiaries abroad and invested in large plants in recent years. The case group is publicly listed, with the largest shareholder being the raw material supplier.

We applied several criteria to select the case company. First, the company had to be sufficiently large to make its various management accounting systems important to decision-making at various levels of the organization in a BI environment. Second, we sought a company in the industrial manufacturing sector to ensure that production and efficiency are crucial to the company's success. Finally, the chosen company had to be willing to allow research access and allocate time for the interviews.

4.2. Research design

This study employed a constructionist qualitative research design to answer the research question, which also makes it possible to view trust as a socially constructed phenomenon (Covaleski et al., 2013; Miles and Huberman, 1984; Morgan and Smircich, 1980; Patton, 2002). The constructionist approach highlights the socially constructed nature of social reality in organizations and is suitable for conveying detailed descriptions and insights that complement and sometimes challenge established views (Covaleski et al., 2017a, 2017b; Granlund and Lukka, 2017; Vaivio, 2008). Qualitative case research often involves a variety of data sources (Ahrens and Chapman, 2006; Vaivio, 2008). We conducted a qualitative case study of the Finnish food producer mentioned above. The data gathered included interviews, accounting documents, and strategy reports from the organization.

4.3. Data sources

Data were collected primarily from face-to-face interviews; however, the dataset was complemented by secondary data, namely accounting documents, factory site visits, and material from annual general meetings (strategy reports). The selection of respondents was influenced by the relatively small number of relevant top executives and their availability for interviews. Consequently, 12 individuals[5] were interviewed as part of our study in late 2015. Bedford et al. (2016) noted that top managers usually possess the most

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[5] The 12 interviews conducted in this study meets the minimum of 12 recommended by Guest et al. (2006) for an interview-based qualitative study. Further, our empirical data from these interviews also reached theoretical saturation.

comprehensive knowledge of an organization's accounting practices. Further, in our case, the selected managers were those making decisions based on accounting information, as filtered by the controllers. Our respondents mostly worked at the managerial level or were in charge of the controller function, which helped us understand the potential relationships related to information trust. The interviewees were either subsidiary- or group-level controllers, oversaw a function (e.g., finance, IT, quality), a business area, or had board-level responsibilities. Table 1 presents the interviewees' profiles.

We used an interview protocol (see Appendix 1) to guide the interviewees through a series of open-ended questions focusing on the key themes of the study: information quality, information trust, management control systems (MCSs), and respondents' thoughts on those key issues and how they relate to each other. For example, we asked interviewees what information systems and measures were used for decision-making, who the key users were, and what issues (person-, information-, or organization-specific) affected information trust. The interview questions were developed using prior literature on information trust, BI, and sensemaking, as presented in Sections 2 and 3.

Two interviewers conducted the interviews to facilitate taking notes and observing the discussion. The discussions varied in length from slightly under an hour to over one and a half hours. The interviews were conducted in Finnish, voice-recorded, transcribed, and translated into English.

The interview transcripts were returned to the interviewees for review, and comments were invited. We received no adverse comments or requests for amendments to the interview text from the interviewees. In addition, the archival and observed data corroborated our interview data, thus improving the validity and reliability of the empirical data (Lillis and Mundy, 2005; see also Covaleski et al., 2017b).

Archival data, such as internal documents, budgeting and performance reports, operational and strategic plans, company video clips, presentations, and other accounting statements, were collected during the study. Additionally, published data were gathered from corporate websites and annual reports. The researchers also spent time familiarizing themselves with the case company, its products, local operating culture, and accounting practices to ensure that they could convey an accurate view of everyday life within the case firm and its developments (see also Golden-Biddle and Locke, 1993).

4.4. Data analysis

We drew information from these three sources when interpreting the data. First, tape-recorded interview data helped develop a "deeper and more general sense of what is happening" (Miles and Huberman, 1984, p. 69) in our research setting. Second, data collected through interviews were analyzed manually from the transcribed word documents with attention to its context, research questions, and theoretical focus, as we believe that "…a person's behavior has to be understood in context, and that context cannot be ignored" (Miles and Huberman, 1984, 91). Third, we utilized a comprehensive set of data to understand how our company attempted to improve individuals' trust in the information produced by its accounting and other business systems, particularly BI systems. During the analysis of the interview transcripts, we classified the excerpts into themes that corresponded to the research focus and theory. Furthermore, we examined the data until our understanding of the findings formed the basis for the conclusions of this study. The following section presents our empirical findings.

5. Findings

This study draws on sensemaking to explore how an organization's controllers engage in sense-giving for accounting information provided by the BI system and thus play a part in building users' trust in the information. Our analysis of empirical data from a Finnish company concerns the BI system, controllers' sense-giving role, organizational sensemaking, and trust in accounting information.

We adopted the following arrangement to present the research findings coherently. The first section (5.1) starts with the BI system and defines it as a vehicle for standardization and shared understanding. It also highlights the problems that a large influx of accounting information from the BI system presents to users and illustrates the need for information management from the users' perspective. Section two (5.2) illustrates how controllers (sense-givers) filter, manage, verify, edit, report, and provide oversight for the accounting information produced by the BI system, thus enabling organizational sensemaking. Section 5.3 shows how the information management role of the controllers enabled the building of accounting information trust.

5.1. The BI system – Axle

The case firm's strategy material for 2013–2015 stressed commercial excellence, which included industry-leading consumer understanding (CEO Presentation, December 4, 2012) as strategically important. The company invested in a new and integrated BI system (here called *Axle*) to address that strategic aim. Axle enables information to be produced in a timely and systematic manner from a single central source. A concerted solution with visual dashboards is intended to deliver a shared understanding of the current business situation, that is, a shared meaning. Furthermore, the discourse shifts from understanding the present to how to proceed in the future. In its strategy material for 2016–2020, the company aimed to "*utilize market and consumer data deeper and more variously than before*" (2016–2020 Strategy, CEO Presentation Nov. 30, 2016). When asked about the reasons (s) for implementing the BI system, several interviewees remarked on the system's capacity to produce large volumes of data to assist in a shared understanding of events. The group's chief information officer (CIO) commented:

Table 1
Profiles of the Interviewees.

Interviewee number	Interviewee position	Date of interview	Length of interview
1.	Business Controller of a subsidiary	Aug. 28, 2015	1 h 23 min
2.	Group controller	Sept. 25, 2015	1 h 07 min
3.	Chief Financial Officer (CFO) of a subsidiary	Sept. 28, 2015	1 h 07 min
4.	Director (one business unit) of the largest subsidiary	Oct. 2, 2015	1 h 14 min
5.	Director (supply chain) of the largest subsidiary	Oct. 19, 2015	1 h 18 min
6.	Chairman, Group board of directors	Oct. 26, 2015	1 h 33 min
7.	Group Director (Quality, responsibility, and product safety), business area director of the largest subsidiary	Oct. 27, 2015	58 min
8.	Group Chief Executive Officer (CEO, group)	Nov. 2, 2015	54 min
9.	Group Chief Information Officer (CIO)	Nov. 2, 2015	1 h 01 min
10.	Chief Executive Officer (CEO) of the largest subsidiary company, member of the group executive board	Nov. 6, 2015	1 h 03 min
11.	Group Chief Financial Officer (CFO, group);	Nov. 27, 2015	1 h 23 min
12.	Director (sales) of a subsidiary;	Dec. 15, 2015	1 h 34 min

> *We mainly implemented this centralized data warehouse and reporting system because we wanted one truth about the performance of the company. We need one official set of data…We need to base our actions on the official data. (Group CIO)*

Then, the group CEO talked about the shared understanding fostered by the new information system. In other words, according to the CEO, collective sensemaking was made possible by a centralized system:

> *There is an enormous amount of data. Everyone drew appropriate conclusions from their perspective. Now, we have managed to progress so that we have shared truth…. we no longer have five or 50 different conclusions. That freed our energy from internal policy debates to [direct to]what-we-should-do questions. This means that we have managed to progress in recent years. (Group CEO)*

A subsidiary company CFO reiterated that standardized reports forced people to look at things from a more uniform perspective:

> *Now that we have standard reports, you cannot challenge them anymore. This type of information does not depend on the controller or the calculations. Everybody has the same figures. (A Subsidiary Company CFO)*

In addition, the 2015 annual report highlighted the importance of standardization, which was described as one of the key strategic projects for 2015, pinpointing the "IT environment by working and communication tool standardization at the group level" (Annual Report, 2015, p. 9). The interviewees seemed quite satisfied with the BI system but were somewhat worried about the massive amount of data and wondered how to select relevant content to aid effective decision-making. Nevertheless, they realized that evaluating management accounting data always involves uncertainty. For example, the group CEO commented:

> *My opinion is that our IS tools are currently in decent shape. Our challenge is to utilize all this information and turn it into action. (Group CEO)*

Two other senior members of the company from different business units echoed these thoughts, highlighting the need for information management.

> *Now we have so much data that we need the competence to use, interpret, and analyze this information so that we do not end up making the wrong decisions. …Due to the great amount of data, I am sometimes afraid that significant issues might be lost in the information overload. (Director, business unit)*
> *The data in Axle is reliable. We can trust it. The data reliability is as high as that obtained from management accounting data. This is as precise as possible. But the data just creates the starting point for decision-making. (Director, business unit)*

The above findings illustrate how the BI system facilitates shared understanding through standardization of the information and provides the starting point for organizational sensemaking of information through the centralized system.

The group CEO commented on the implications for the organization of having a large volume of information, even Big data analysis:

> *We must find the most critical issues from the large volume of information. We must consider the critical issues of our steering group. The volume of information is enormous. I would make many incorrect decisions if I reacted to every piece of information. (Group CEO)*

A business-unit director also highlighted the need to focus on information to support decision-making.

> *Our complex organizational structure certainly has an impact [on information trust]. Many small subsidiaries and departments have been treated as independent firms. When we transfer raw materials or products between subsidiaries, there is always some concern over the accuracy of transfer prices…. The key purpose of management accounting should be to produce information that helps to evaluate the best way to get the highest profit from the end product. (Director, business unit)*

The findings above and our review of several accounting and management reports indicate that while the BI system provided a wide range of data on operational matters such as market share, sales forecasts, and company performance, interviewees emphasized the

need for information management. An organizational focus on product costs and profit maximization may guide controllers' sense-giving efforts through their data filtering activities. Controllers play important roles in this respect by providing information through their work and, thus, in part, constructing information trust. The next section describes this aspect.

5.2. The sense-giving role of the controller

The interviewees reported that business unit-level day-to-day operational issues play a key role in sensemaking regarding information trust. They highlighted the role of controllers in their sense-giving roles concerning the information provided by the BI system. Furthermore, most interviewees considered it important that representatives of business units and business areas were involved in sense-giving by explaining variations in performance because they knew the reasons for those variations. For example, the company sales director commented:

> *I have always told my organization that if something surprising occurs that we did not consider as a possible scenario beforehand, I want to know it immediately. It does not matter whether it is a good or a bad issue. (Director, Sales)*

A business-unit director elaborated on the role of management accountants in giving sense to the information, plausibility, and the role of retrospection; that is, prior experience as a manager in an uncertain, complex situation:

> *Information trust depends greatly on the person. Because a business controller is a managerial accountant, the priority task in my mind is to produce accurate and relevant figures. I can make decisions based on accurate information. Accountants must be capable of producing information for decision-making that is sufficiently accurate without attempting to strive for absolute truth. Decision-making cannot be based on absolute truth. It will take a lot of time if our calculations seek to achieve absolute truth. (A Director, business unit, emphases added)*

In information processing, a business unit controller outlined the usefulness of the BI system and the process utilized for information management.

> *We have tried to prepare better sales forecasts using the new BI system for market forecasting. We produced a single master dataset, which was then utilized for a more detailed and customized analysis. Now people do not have to create separate demand forecasts. (Business unit controller).*

Furthermore, the business controller can serve as a sense-giver of information by systematically moderating the presentation and collection of information:

> *The controller is incredibly good at utilizing the data provided by the BI system. He knows what that data means and can process it. (Director – Business unit)*

Several interviewees mentioned the high level of competence among controllers from different countries. According to the Group CFO:

> *[The controllers in a certain country] have an incredibly positive atmosphere. They are extremely professional there…I do not know whether it is good luck or something else; we have found particularly good people there. (Group CFO)*

Most interviewees also mentioned that a person skilled in managerial accounting could filter the most relevant data for analysis and decision-making. The sense-givers' role as information moderators or filterers was recognized among information producers (e.g., CFO, controllers) and decision-makers (e.g., a CEO and directors). Below, we present a subsidiary company CEO's view of the role of a skilled CFO or an experienced management accountant in producing plausible information in the sense that it is of high quality, filtered, and relevant:

> *The CFO has been here so long that he knows our issues profoundly and conducts good analysis while providing a reasonable amount of data. The CFO does not always provide enormous amounts of data, and he filters the essential data. (CEO, a subsidiary)*

The CFO of a subsidiary concurred with the CEO's notion of the role of the management accountant in analyzing and filtering a large amount of information:

> *As a CFO, I am the CEO's right hand. I decide what he should know. I cannot tell the CEO all of the interesting themes. I must see relevant pieces of information from the CEO's perspective. I must separate the relevant information for the CEO so he can make decisions. (CFO, a subsidiary)*

Notably, the comment "*I decide what he should know*" suggests some room for preferences, which may again affect the sense given to events (and thus the sense made by the final decision-makers). The company's sales director commented on the role of the controller in sense-giving and emphasized the importance of focused information in work:

> *I begin my day by visiting the controller's office and asking how things are going in our firm. The controller was used for this purpose and prepared for this meeting. Usually, I don't even ask anything before the controller starts to describe the performance of the key measures… That five-minute discussion reveals what I must do next if I do not have any other meeting scheduled. (Company Director - Sales)*

Controllers realized the importance of their role and the significance of giving sense to information. They aimed to ensure that the information they forwarded was plausible, reliable, and relevant. They sought to build a solid reputation (Johnson et al., 2015) to produce trusted information. Next, we outline how the BI system and the controller's sense-giving activities (filtering, management,

verification, editing, reporting, and oversight helped build trust in the accounting information.

5.3. Trust in accounting information and organizational sensemaking

Managers who did not utilize the BI system trusted their controllers. They believed that controllers have experience creating reliable cost calculations to support different decision-making situations, giving sense to various events and situations. However, the trust placed in accounting information also seems to depend on the purpose of the information. In other words, information intended to be utilized to improve cost-efficiency, echoing the cost-conscious cultural identity of the firm, seemed to earn more trust. The interviewed managers highlighted the credibility or plausibility of the information. They perceived controllers produced accurate (but not necessarily 100 % exact) calculations; however, managers seemed to evaluate information reliability depending on various decision-making situations. The company chairman commented:

> These investments [that] help improve cost-efficiency; I have absolute trust in our ability to execute and calculate them well. We have so much experience in these kinds of operations, and they have been successful in the past." (Company chairman)

The chairman mentioned standardization efforts driven by the BI system. He reflected on controllers in different countries and concluded that they were very professional:

> We can trust the information [from a specific country] and that the performance is what they tell us it is. We have had no surprises recently. Many managers there have been changed. Nowadays, firm culture is like here, and they follow standard operating methods. This change has helped. (Company chairman)

Furthermore, the controllers interviewed emphasized another view of retrospection, arguing that trust in the information on figures depends on whether people use the information they have put into the system in the first place. The level of information trust is higher if the person who enters the information is the same person who subsequently utilizes it. Accordingly, people involved in information management (controllers) consider information trustworthy:

> We must have high-quality staff who can be trusted. This type of trust in competence increases trust in the information. We need to convey controllers' expectations and why those expectations exist. (Group controller)
> If those people who utilize information are also responsible for data input, it increases the perception of accurate data. If there are people who input the data but do not use the IS themselves, the user is likely to have an impression of inaccuracy. (A business unit controller)

The Group Controller also addressed this issue by emphasizing the importance of business units and explaining the numbers:

> One factor affecting the trust people place in the information is that business units explain their performance. Then we will not have to invent these explanations at the group level. (Group controller)

The results reveal that the centralized BI system enabled individuals to construct a shared understanding of the information filtered by the controllers. The findings further highlight the controllers' roles in organizational sensemaking and building trust in accounting information. They indicate that, within the organizational BI system, which produces a large volume of data, controllers act as information moderators or filterers in giving sense to information. As a result, controllers, through their sense-giving efforts, build trust in accounting information even if the organizational context is considered complex.

The empirical evidence indicates that the characteristics of the BI system in our case firm, such as standardization, create a shared meaning for the information, thus fostering organizational-level sensemaking. Furthermore, we reveal that accounting information trust and information use are complex, interrelated concepts affected by the organization's functional needs, environment, accounting systems, and various accounting professionals, such as controllers.

6. Discussion

In our case, BI, as a centralized data system, increased the information system users' trust in the information. This is because a standardized information system allows people to construct a shared understanding of the information through collective sensemaking. Furthermore, trust is amplified by trustworthy personal relations and the analysis performed by controllers (see Robalo and Moreira, 2020) that gives sense and builds plausibility (Barrett and Gendron, 2006; Maitlis and Christianson, 2014; Weick, 1995). Accordingly, controller work has a data legitimation aspect, even if the data analytics system creates reports independently. This finding suggests that accounting professionals build organizational practices for information relevance and trust (Johansson and Baldvinsdottir, 2003). Accordingly, the controller's role becomes more relevant in the context of the large volumes of data provided by BI systems, with the need to filter, moderate, interpret, and give sense to the information produced (Appelbaum et al., 2017; Johansson and Baldvinsdottir, 2003; Tillmann and Goddard, 2008).

Additionally, the findings show that controllers, particularly experienced business partners or CFOs, have a substantial effect on information trust and the sensemaking process in organizations. According to sensemaking theory, the sensemaking of information users is affected by individual issues at the business-unit level, such as position, work experience, and managerial style, via the influence of retrospection, all of which affect the cues that users extract from the information flow and what they consider trustworthy information. In contrast, sense-givers, that is, controllers, have a significant effect on the information used through their role as information filterers, selecting the information most relevant for decision-makers, that is, by filtering and interpreting information and thereby giving sense to it according to organizational preferences (or frameworks, see Gioia and Chittipeddi, 1991; Weick, 1993), such

as focusing on cost-efficiency. The actions and choices of these sense-givers contribute to the credibility of the information flowing from the BI system. In sensemaking terms, the information provided by the BI system is deemed plausible (Weick, 1995). In addition, the BI system improved information trust when users could create reports based on commonly shared and valued data that they had entered into the system, which shows the retrospective aspect of sensemaking (Maitlis and Christianson, 2014; Weick, 1995). The system also helped create a shared meaning applicable to truth (Busco et al., 2006), which the interviewees said freed their time to engage creatively in decision-making.

Our data analysis highlighted the sense-giving role of controllers when acting as moderators/filterers (Goretzki and Messner, 2016) (credible both individually and at the professional group level) in managing data to formulate collectively acceptable information. These actions co-create trust in management accounting information, which, combined with the existence of such a professional function, enhances the plausibility of the BI system and the information produced.

These findings illuminate the role of controllers in building trust when serving as providers of trust (c.f Barrett and Gendron, 2006). Analyzing how management accountants use BI in their business context enhances understanding how accountants and modern accounting/BI systems can serve as legitimate trust providers (Barrett and Gendron, 2006). Moreover, the research findings show the crucial role of management accountants in creating trust in and taking advantage of contemporary BI and analytics tools, where perceived data quality can be a success factor alongside actual data quality (see Appelbaum et al., 2017).

Additional findings indicate that when controllers enter data into an information system, they trust the information and analytics it produces, even when the artificial IT system's data analysis methods were previously unknown and uncertain. This finding highlights the retrospection that associates information and context with familiarity, including retrospective reasoning on the quality of input data (Dahlbom et al., 2020) or the sources of the reports affecting trust and understanding (Quattrone, 2016). Furthermore, this highlights the interaction between systems and users in building trust (Jeacle and Carter, 2011) and how trust affects BI and data analytics usage in such interactions (Rikhardsson and Yigitbasioglu, 2018).

7. Conclusions

This study highlights the importance of plausible accounting information filtered by controllers from the organization's information system infrastructure (BI). Furthermore, it shows the role of controllers in giving sense to the information they process and supply to managers (Weick, 1995), thereby building information trust. The findings of this study therefore contribute to the existing accounting information systems (AIS) and management accounting literature and offer several significant conclusions.

First, study contributes to the literature by providing empirical evidence on the roles and importance of controllers (management accountants) as moderators/filterers of accounting information. A controller's task is to filter out irrelevant information from the data the BI system provides, thereby acting as a sense-giver. We empirically establish that managers relying on controllers' sense-giving to ensure they receive relevant information must trust those controllers, the accounting process, the figures produced, and the information source (including the IT system).

The notion that management should trust information from several sources (comprehensive trust) contributes to studies on accounting information relevance and trust in sensemaking (Johansson and Baldvinsdottir, 2003; Maitlis and Christianson, 2014; Mättö and Sippola, 2016). In particular, entering data personally into an information system (in our case, a BI system) increases trust in the information, regardless of the quality of the data input. Users also had a good idea of what constituted a plausible value to be recorded. This combination of personal and system trust with the controllers' role in moderating/filtering accounting information and giving sense to data contributes to recent studies on management accounting and sensemaking (Jordan and Messner, 2012; Tillmann and Goddard, 2008). The controllers' role of enhancing data trustworthiness signals the continuing need for management accountants, even in the era of big data and AI-based data analytics (see Quattrone, 2016; Appelbaum et al., 2017; Rikhardsson and Yigitbasioglu, 2018; Moll and Yigitbasioglu, 2019).

Second, instilling information trust depends on the design of the information system and various parties' information needs. The ability of an information system to promote shared understanding across the organization, for example, through standardization, is conducive to collective sensemaking. In other words, centralizing data through an accounting information system increases perceived information trust by lending information plausibility through standardization and shared understanding. Further, perceived usefulness, the plausibility of the system and data, and the reputation of the controllers (and other accounting professionals involved) shape accounting information trust.

The current case study of a Finnish manufacturing company revealed how the controller's role becomes more relevant in the context of the large volume of data provided by the BI system. That volume heightens a need to filter, moderate, interpret, and give sense to the information produced. However, the usual limitations of qualitative case studies apply to our findings. While we strived to ensure a match between our research design, interview questions and the research question (Vaivio, 2008), our findings are limited to a single case organization. As such, generalizing the findings requires careful consideration of the organizational context. Further, data gathering through interviews always risks interviewee bias. The current study addressed that limitation by interviewing both those in charge of information management (controllers) and those using that information to inform their decision-making. Further, we complemented our empirical material with other data sources, such as documents.

To extend our study, we recommend investigating the formation of information trust, organizational sensemaking, and the role of controllers in firms operating in different settings and strategic contexts, such as new product innovation, business networks, public–private partnerships, and start-up firms in this era of extensive digital transformation. We also recommend investigating the effects of the recent COVID-19 pandemic on organizational sensemaking of accounting information. Furthermore, future studies may wish to use alternative research designs such as surveys and experiments to explore the following relationships that emerged in our study: 1)

the way that BI system specifications influence sensemaking through shared understanding; and 2) how controllers act as sense-givers through their information management role (filtering, managing, editing, reporting, and oversight); the extent to which these activities 3) build trust in accounting information, and 4) trust in organizational sensemaking.

Declaration of Competing Interest

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

Data availability

The data that has been used is confidential.

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Appendix 1. . Interview protocol (topics/questions)

1. Personal details: Education, employment experience, and roles
2. Identification of firm success and key performance measures
   a. When can you say: "our performance is good?"
   b. When are the stakeholders satisfied?
   c. What will you do if the stakeholders have conflicting expectations?
3. Directors of the board (group)
   a. How often do you hold board meetings? What is the procedure? What measures have been reported in this regard?
   b. How is the information shared among various corporate governance levels?
   c. What information is required by the largest shareholders, and what are their expectations?
4. Steering committee
   a. How often do you hold steering committee meetings? What is the procedure? What measures have been reported in this regard?
   b. How is the information shared among various corporate governance levels?
5. What information systems and measures do you use in the following decision-making situations?
   a. Strategic and operational planning
   b. Control/ performance evaluation
   c. Risk management, bonus scheme (criteria), demand forecasting
6. Who is involved in a) choosing, b) implementing, and c) maintaining IS (and what is the process involved)?
7. Why do you construct and use different performance measurement systems?
8. Trust in information; What factors affect information trust (credibility/reliability):
   a. Person-specific factors (experience from current and previous firms)
   b. Information-system-specific characteristics (e.g., content, accuracy, format, ease of use, timeliness, relevance)
   c. IS constructors/maintenance people (e.g., accountants)
   d. Contingency-specific factors (e.g., size, organization structure)
   e. Why are there so many subsidiaries in the group? Does this structure affect the information content and trust?
9. What will you do if your trust in MCS information is low? What other information will you utilize (e.g., private information sources)?
10. What causes a change in the level of information trust?
11. What is the most valuable information to support decision-making (planning, control, risk management, reward/compensation, and demand forecasts)?
12. Do stakeholders affect the information they use? Do these have an impact (or information requests)?

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