

Multiple control mechanisms for employee health and safety integration: effects and complementarity

Employee health and safety control mechanisms

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Abstract

Purpose – This paper aims to analyse the extent to which health and safety action controls, results controls and informal controls affect the integration of health and safety issues into management actions, which in turn leads to improve health and safety performance. It also investigates the extent to which those health and safety control mechanisms contribute complementarily to the integration of health and safety issues.

Design/methodology/approach – A survey of 108 Italian non-listed firms tests a set of hypotheses based on complementarity theory and object of control framework.

Findings – Not all the health and safety control mechanisms positively influence the integration of health and safety issues into business practices and external stakeholder relations. Complementarity between health and safety control mechanisms is significant only for higher health and safety performance companies, indicating that the health and safety control mechanisms operate as a package.

Research limitations/implications – The health and safety performance measure could be replaced in future research by improved inter-subjectively testable information, although collecting health and safety quantitative data is difficult. An additional limitation is the response rate.

Practical implications – The findings encourage companies to design and use a comprehensive set of health and safety control mechanisms to promote a healthy workplace.

Originality/value – The paper contributes to the management control, sustainability management control and health and safety accounting literature. The paper provides an in-depth interdisciplinary analysis of the

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effectiveness of different control mechanisms in the context of health and safety that hitherto has rarely been investigated despite the multiple importance of the topic.

Keywords Action controls, Results controls, Informal controls, Complementarity, Health and safety, Management control

Paper type Research paper

1. Introduction

The global health emergency related to the COVID-19 (SARS-CoV-2) pandemic has reemphasised the importance of proactive management of employee health and safety (H&S) issues for the proper functioning of societies, organisations and economies. Given the new goals, rules and behaviours that will emerge in society and organisations to assure H&S in everyday life, it is crucial to extend the discussion of H&S in management control and accounting studies, adopting interdisciplinary perspectives to show the synergies between control measures and the management of H&S (Bouten and Hoozée, 2016; Caicedo and Mårtensson, 2010; O'Neill *et al.*, 2013). Moreover, the topic is relevant to the study given that 340 million work-related injuries occur every year, of which 2.3 million are fatal (O'Neill *et al.*, 2015).

Different interrelated choices exist to promote the integration of H&S issues in the workplace. In this research, H&S issues are defined as the different aspects entailing practices, decisions or actions concerned with the safety, health and welfare of people in the workplace (Barnett-Schuster, 2008). The establishment of both safety culture and safety climate that include hazard reporting, active communication, management commitment and leadership, employee participation and training, making everyone accountable for safety are meaningful ways to integrate H&S issues (Fernández-Muñiz *et al.*, 2007; Guldenmund, 2010; Zohar, 2010). Also, the use of appropriate equipment and tools for the job and the promotion of independent audits are critical choices to integrate H&S issues (Sadiq, 2012). Finally, the design and use of dedicated control mechanisms are an additional way to promote healthy workplaces (Bouten and Hoozée, 2016). However, even though H&S control mechanisms are important nowadays in organisations, their analysis is still under-researched and under-theorised.

H&S control mechanisms to create safer work environments are an extension of management control (Bouten and Hoozée, 2016; Caicedo and Mårtensson, 2010; O'Neill *et al.*, 2015b; O'Neill and Wolfe, 2017). They are formal and informal procedures, routines, processes and practices, which make it possible to self-regulate, guide and continuously assess H&S performance at both strategic and operational levels. They support the definition of H&S organisational goals, responsibilities, internal communication and resource allocation at the strategic level. At the operational level, they support the H&S task definition, protect staff and workers and help to minimise H&S risks. Their design and use can promote the integration of H&S issues, that is the act or process of combining two or more elements so that they work together (Hornby, 2000) to implement successful analyses that spread H&S principles into a variety of organisational activities (Casey *et al.*, 2017; Frey *et al.*, 2014; Loeppke *et al.*, 2015).

The topic of H&S control mechanisms is also related to management control literature, and in particular, to the discussion of a package of controls. The management control package of an organisation comprises “the complete set of control practices in place” (Grabner and Moers, 2013, p. 408). A stream of literature has argued that controls should be complementary, operating as a system, because no stand-alone control is sufficient to foster integration and achieve better performance (Bedford and Malmi, 2015; Grabner and Moers, 2013). A different view argues that control mechanisms are not interdependent, and companies develop autonomous types of control for different aspects, designing a package approach to management control (Malmi and Brown, 2008; Otley, 2016).

The study of management control as a package requires further discussion as the literature presents mixed findings (Demartini and Otley, 2019; Matějka *et al.*, 2020; Mundy, 2010). Despite their incidence “informal control is not an area that has been extensively or explicitly

considered in management control research, yet a failure to more explicitly identify how informal control operates within organisations constitutes a fundamental impediment to the further development of management control [...] and particularly in investigations of management control as a package” (Tucker, 2019, p. 220). While numerous calls to study informal controls exist (Cardinal *et al.*, 2017; Otley, 2016; Tucker, 2019), they have not been analysed as much as formal accounting control mechanisms (Braumann *et al.*, 2020; Friis *et al.*, 2015; Henri and Wouters, 2019). A risk is to provide “serious model under-specification” as failing to recognise the potential link between various control mechanisms may lead to mistaken conclusions about the types of controls developed by organisations and their effects (Chenhall, 2003, p. 131). As a consequence, the internal consistency between formal and informal control mechanisms have not yet been analysed sufficiently even though it is a pivotal topic to deepen the understanding of management control package functioning. The analysis of H&S control mechanisms is also relevant for the analysis of the under-investigated social dimension of sustainability (Bebbington and Thomson, 2013; Bebbington and Unerman, 2018).

To help fill these gaps, this paper analyses the extent to which H&S action controls, results controls and informal controls affect the integration of H&S issues into two different management actions, i.e. business practices and external stakeholder relations. The latter, in turn, leads to H&S performance. The paper also investigates the extent to which the H&S control mechanisms contribute complementarily to affect the integration of H&S issues. The paper is one of the first interdisciplinary studies in the accounting literature that offers an in-depth analysis of the effectiveness of different control mechanisms in the context of H&S.

A set of hypotheses is developed following complementarity theory (De Jong *et al.*, 2014; Turner and Makhija, 2006; Kreutzer *et al.*, 2016) and Merchant and Van der Stede’s (2007) object of control framework. It makes it possible to consider both formal (action and results) and informal (softer social) management control mechanisms. The hypotheses predict a set of relationships between H&S control mechanisms, management actions and H&S performance. Survey data from a sample of 108 Italian non-listed companies was used to test the hypotheses. The empirical results, based on partial least squares structural equation modelling (PLS-SEM), support a sub-set of the hypotheses developed. The paper makes three main interdisciplinary contributions concerning management control, sustainability management control and H&S accounting literature.

The next section defines the conceptual aspects and presents a literature review. Section 3 presents the hypotheses. Section 4 sets out the research methodology. Section 5 presents the findings and Section 6 discussion and contributions to the literature. The final section provides conclusions.

2. Control mechanisms and H&S

Different management control frameworks have been proposed in the literature. They include Simons’ (1994) levers of control, the balanced scorecard (Kaplan and Norton, 1996), the sustainability balanced scorecard (Hansen and Schaltegger, 2016) and Adler and Borys’ (1996) enabling and coercive models of control. Other frameworks that have been suggested are Ferreira and Otley’s (2009) performance management system, Broadbent and Laughlin’s (2009) performance management systems model, Malmi and Brown’s (2008) management control package, Tessier and Otley’s (2012) model of Simons’ levers of control and Merchant and Van der Stede’s (2007) object of control.

This research relies on the object of control framework, which classifies control mechanisms according to their focus. The object of control framework is well-grounded in a long line of empirical research that builds on Ouchi’s (1977; 1979) seminal classification of organisational controls. It makes it possible to identify the full extent of independent organisational control mechanisms (Goebel and Weißenberger, 2017). It includes informal controls, while other frameworks focus exclusively on formal control mechanisms (Adler and

Borys, 1996; Simons, 1994). It is sufficiently comprehensive for the analysis of a package of controls, but it is also parsimonious. Compared with the balanced scorecard (but the same analysis can be made for Simons' levers of control), which focuses on competitive aspects and which has been widely investigated (Sundin *et al.*, 2010), the object of control framework is a relatively new framework that has been investigated very little (Goebel and Weissenberger, 2017; Sandelin, 2008; Pfister and Lukka, 2019; Van der Kolk *et al.*, 2019). Other frameworks are broader and more difficult to test empirically, at least in survey analysis (Broadbent and Laughlin, 2009; Ferreira and Otley, 2009; Tessier and Otley, 2012). The framework proposed by Malmi and Brown (2008) includes a variety of formal controls and informal control mechanisms, but there is a potential overlap between the mechanisms identified.

A package approach indicates a (complete) set of control mechanisms in place, regardless of whether the functioning of control mechanisms is interdependent or the design choices take interdependencies into account (Demartini and Otley, 2019; Grabner and Moers, 2013). From this perspective, organisations "constitute a package of distinct control mechanisms that have been separately designed and implemented without an overall intention or coordination, but where each element aims to facilitate the attainment of different aspects of organisational goals" (Otley, 2016, p. 53). In a package approach, the control mechanisms operate independently.

Formal controls include action and results controls (Merchant and Van der Stede, 2007). Action controls include the appropriate behaviours, specific procedures, rules, responsibilities and job descriptions that employees must engage with to achieve organisational goals (Turner and Makhija, 2006). They are useful when managers know what actions are (un)desirable and can ensure that (un)desirable actions (do not) occur (Merchant, 1998). They are conceptually coherent with the integration of H&S issues, which requires the definition and communication of actions, responsibilities and employee accountability.

Results controls define performance outputs, standards and goals and monitor and evaluate performance at the individual and organisational levels (Sihag and Rijdsdijk, 2019). H&S issues that are to be integrated with management actions require the planning of key performance metrics that can be used to measure the effectiveness of strategies and programmes and determine their value for the organisation and external stakeholders (Bouten and Hoozée, 2016; Gunarathne *et al.*, 2016).

Informal controls are "the unplanned, spontaneous and noncodified information-based routines, procedures and practices that collectively generate and transmit information through vertical and lateral interpersonal relationships prevailing within an organisation to influence, maintain, or alter patterns in organisational activities" (Tucker, 2019, p. 230). They describe a range of unwritten but collectively accepted organisational values, norms and beliefs that guide employees' choices and actions (Cardinal *et al.*, 2010). Informal discussions and sharing of experience between employees and managers at different organisational levels are necessary to integrate H&S issues into management actions because they help create a safe work environment (Bouten and Hoozée, 2016; De Jong *et al.*, 2014).

The characteristics of the object of control framework make it possible to discuss whether a system approach or a package approach to management control and the related question concerning the internal consistency between formal and informal control mechanisms, is more effective (Grabner and Moers, 2013; Malmi and Brown, 2008; Tucker, 2019). The aim is to understand whether the performance effect of a control mechanism depends on the presence of other controls (Demartini and Otley, 2019).

The control mechanisms operate as a system —i.e. they are interdependent— when the performance effect generated by the combination of control mechanisms is significant and higher than the sum of the parts. In such a case, the combination of control mechanisms operates in a complementary manner. Conversely, if the effect of one control mechanism decreases when another control mechanism is present, the performance effect is less than the sum of the parts and control mechanisms operate as substitutes (De Jong *et al.*, 2014).

The distinction between system and package approach implies that a control package can be composed of a set of controls that operate as a system or of a set of independent control mechanisms addressing unrelated control problems (Grabner and Moers, 2013). Understanding the single performance effect of control mechanisms, as well as their joint effects (if any), helps in the discussion of management control package functioning.

The choice of these three types of control mechanisms also resonates with the H&S accounting literature that addresses control problems. O'Neill and Wolfe (2017, p. 17) identify three broad types of H&S control (i.e. technical, governance and cultural) that can integrate H&S issues into an organisation's business strategy and operations, considering specific mechanisms such as motivation, employee behaviours, sharing of information and resource allocation. The authors also argue the importance of empirically validating and refining the broad types of H&S control in order to assess the effect and effectiveness of various control mechanisms in the context of H&S (O'Neill *et al.*, 2015b).

The H&S accounting literature has paid attention to the analysis of why and how companies develop accounting tools that inform accident analysis and H&S decision making (Passetti and Battaglia, 2020; Tappura *et al.*, 2015). Cooper *et al.* (2011), for example, argue the importance of accounting for all the money spent by companies to prevent H&S accidents, improve H&S management systems and inform internal and external stakeholders about H&S company decisions. Gunarathne *et al.* (2016) show the use of a set of key safety performance indicators as technical control mechanisms. Other studies investigate the characteristics of H&S external reporting and H&S disclosure (Amernic and Craig, 2017; Christ *et al.*, 2019; Evangelinos *et al.*, 2018; O'Neill *et al.*, 2015a, 2016) and the functioning of human resource accounting (Flamholtz *et al.*, 2020). The sustainability management control literature provides many relevant studies of control mechanisms coordination, integration and performance effects. It mainly focuses on accounting and management control mechanisms for environmental issues (e.g. Burritt and Schaltegger, 2010; Lisi, 2015; Qian *et al.*, 2011; Passetti *et al.*, 2018; Pondeville *et al.*, 2013).

Instances of H&S issues have been provided. Ditillo and Lisi (2016) report that H&S issues are monitored, evaluated and integrated using results controls such as H&S targets and the budget for safety investments. Also, some types of action controls are implemented in terms of H&S responsibility and regular and formal H&S meetings. Arjaliès and Mundy (2013) report that H&S performance is linked to incentive systems. Passetti *et al.* (2014) show that companies use traditional indicators of severity and frequency of accidents to assess H&S performance. The use of indicators of severity and frequency of accidents to assess H&S performance is criticised by O'Neill *et al.* (2013). It is argued that such indicators, such as measures of time lost through injury, are neither valid nor reliable measures of injury (or safety), and therefore, inappropriate for informing the H&S decisions of managers, boards and external stakeholders. Sundin *et al.* (2010) report that the balanced scorecard is used to balance multiple competing objectives arising from various stakeholder groups. Conflicts could arise between customer service and employee safety, or financial and safety performances. Safety indicators are used to balance the tensions between conflicting objectives because "safety was [...] seen as something that must be secured because the company does not want anybody to die at work (p. 231)". Bouten and Hoozée (2016), using a case study, indicate that H&S control mechanisms were used in a complementary manner, calling for more studies to assess the topic. They underlined that to embed H&S throughout the entire company, different types of controls are required, as well as symbols, rituals and ceremonies.

The present literature review indicates a significant gap in the analysis, as H&S control mechanisms have not yet been analysed systematically in sustainability management control and H&S accounting studies. The studies analysed, mainly based on qualitative analysis, provide a frame but lack in-depth and cross-sectional studies, in particular of the effects of a comprehensive set of H&S control mechanisms on the integration of H&S issues. Figure 1

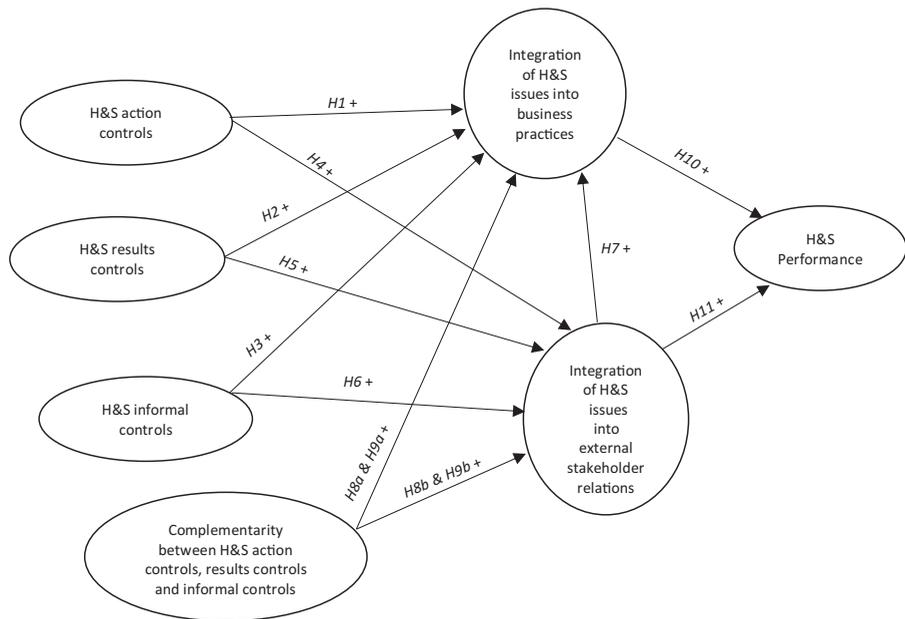


Figure 1.
Path model

summarises the conceptual paths among the different concepts. The H&S control mechanisms (i.e. action, results and informal) affect the integration of H&S issues on two different management actions, i.e. business practices and external stakeholder relations. Following [Schaltegger and Burritt's \(2010\)](#) twin-track approach to sustainability accounting, the two categories of management actions consider both internal and external aspects and provide a comprehensive analysis of what is related to the integration of H&S issues. The final component (H&S performance) reflects the influence of management actions on desired H&S performance.

3. Hypotheses development

This section presents the development of the different hypotheses ([Figure 1](#)). It explains the association between H&S action controls, results controls and informal controls and management actions, and in turn, the association between the latter and H&S performance. This section also details the complementarity hypotheses between the H&S control mechanisms. Eleven hypotheses are discussed.

3.1 The relationships between H&S control mechanisms and management actions (H1–H3)

The integration of H&S issues into business practices can be supported by the development of action controls ([Rasmussen, 1997](#)). The analysis of H&S issues is a prerequisite for business excellence and must be considered alongside cost, innovation, quality, flexibility and delivery ([Brown, 1996](#)). However, H&S issues and business aspects may be managed as separate and unequal silos leading to inefficiency, accidents and injuries. The use of H&S action controls may align H&S and business objectives, avoiding organisational silos ([Pagell et al., 2104; 2015](#)). The definition of rules and responsibilities, as well as a precise distribution of tasks, generates pressure on employees to perform operational tasks in a safer way, enabling the integration of H&S issues into business practices. Action controls may operate as a signal of both H&S normative pressure and company proactivity since employees recognise safety as a core element of the organisational mission and culture. The implementation of action controls may

limit individual behaviour to actions considered safe and productive, holding employees accountable for the actions they take and encouraging integration (Reason *et al.*, 1998). Action controls may also prompt managers and employees to understand H&S information better and identify novel and potential H&S friendly solutions in business practices (Gomez-Conde *et al.*, 2019). This leads to the following hypothesis:

- H1. H&S action controls are positively associated with the integration of H&S issues into business practices.

H&S results controls make it possible to define a safe working environment where employees are rewarded for achieving specific H&S targets and integrating H&S issues with business practices. The planned system increases employee alignment with H&S standards, their commitment and involvement, motivating them to achieve the results organisations reward (Merchant, 1998). Companies may streamline organisational H&S goals by integrating H&S issues in their business practices and identifying the appropriate H&S results that are actively fostered.

By defining the company's H&S strategic vision for both top-line managers and operations using results controls, companies show that H&S management is a clear and salient organisational goal, and managers ensure that employees understand how their roles and responsibilities align with the H&S organisation's goals. It is even more critical where higher productivity and efficiency may increase H&S risks. Therefore, H&S results controls may be essential for the integration of H&S issues into operational and strategic actions, securing organisational coordination and controllability (Merchant, 1998). Based on these considerations, the following hypothesis is formulated:

- H2. H&S results controls are positively associated with the integration of H&S issues into business practices.

New and unpredictable H&S risks may occur and require reactions that are not always prescribed by the formal controls (Casey *et al.*, 2017). In addition to H&S action and H&S results controls, companies should also develop informal H&S controls to support the integration of H&S issues into daily operations and business practices. They can facilitate shared values, beliefs and understandings, embedding H&S principles into the organisation (Testa *et al.*, 2020). Informal controls are linked to the concepts of safety culture and safety climate. They promote proactive behaviour by strengthening employees' competence, improving their motivation and guiding employees' decisions in risky situations (Curcurato *et al.*, 2015; Neal and Griffin, 2006; Zohar, 2010). Informal feedback between managers and employees can enhance safety participation, increasing the ability of employees to comply with formal instructions, reducing injuries and improving overall performance. Informal controls may disseminate H&S values across the broader organisation, leading to an increased collective awareness of hazards in work areas and of the importance of safety commitments. Protecting, enhancing and integrating H&S issues through informal controls improves the relevance of safety attention and prevention as core organisational value supporting operational aspects, local resilience and H&S alignment at different company levels and leads to the following hypothesis:

- H3. H&S informal controls are positively associated with the integration of H&S issues into business practices.

3.2 *The relationships between H&S control mechanisms and stakeholder relations (H4–H6)*

Empirical and theoretical analyses make clear that the long-term survival and success of a company are determined by its ability to establish and maintain relationships with a broad set of external stakeholders in order to satisfy their requirements (Freeman *et al.*, 2010; O'Neill *et al.*, 2015a, 2016). Pressures from government bodies and national and international agencies may push companies to implement effective H&S management practices (Battaglia

et al., 2015; Hörisch *et al.*, 2017). Labour unions may also demand actions to minimise risks and reduce accidents and injuries (Passetti *et al.*, 2014). However, companies may face technical, organisational and behavioural barriers that prevent the integration of stakeholders' concerns (Battaglia *et al.*, 2016). The management of external stakeholder relations may increase the time and cost related to the (mis)allocation of economic resources and the time required for interacting with them and prioritising their requests in the absence of specific control mechanisms (Bridoux and Stoelhorst, 2014; Rodrigue *et al.*, 2013). Further, conflicts may arise with stakeholders about the actions implemented and the performance achieved by companies if they are not monitored (Reynolds *et al.*, 2006). Also, companies tend to discriminate between primary and secondary stakeholders based on their different impacts on company performance (Harrison *et al.*, 2009).

As H&S commitment and the related stakeholders' demands can be considered a critical organisational objective, companies should develop different H&S control mechanisms that favour proactive monitoring and assessment of such external stakeholder relations. Control mechanisms not only internalise stakeholders' requests, but they also guide the organisation towards managing them (Arjalès and Mundy, 2013; Rodrigue *et al.*, 2013).

Action controls and results controls can support the recognition of primary external stakeholders and help to align the firm's H&S targets and choices with stakeholders' H&S requirements (Narayanan and Boyce, 2019; Wijethilake *et al.*, 2017). H&S action controls may underline the importance of stakeholder relations to employees, offering guidelines that support stakeholder management. Action controls may formalise and define appropriate and specific procedures, rules and responsibilities for engaging with external stakeholders. Given the complexity of managing stakeholder relations, clear action plans can increase organisational congruence and awareness of the topic (Narayanan and Boyce, 2019). H&S results controls may support measures that consistently direct managers' and employees' attention to external stakeholders, generating information and supporting feedback (Crilly and Sloan, 2013). Results controls may also support the communication of H&S performance to external stakeholders, providing information that may be included in external reports. Finally, the presence of results controls that formally addresses stakeholder needs during the planning process may help integration of H&S issues, as results controls can signal the importance of external stakeholders in the organisational structure.

To summarise, by the development and use of action controls and results controls, companies may enable proactive monitoring and assessment of stakeholders' needs, avoiding the superficial adoption of practices intended to improve external legitimacy (Gomez-Conde *et al.*, 2019). These considerations lead to the formulation of the following hypotheses:

- H4. H&S action controls are positively associated with the integration of H&S issues into external stakeholder relations.
- H5. H&S results controls are positively associated with the integration of H&S issues into external stakeholder relations.

H&S informal controls may also have a crucial role in translating external stakeholders' perspectives into tangible managerial actions (Norris and O'Dwyer, 2004). The aim is to increase awareness of the ties between specific external stakeholders' concerns and H&S performance (Rae and Alexander, 2017; Testa *et al.*, 2020). An organisation may define policies concerning external stakeholder relationships, but translating them into a specific situation and action will depend on collaboration and information sharing between employees, which informal controls can enhance and sustain (Falkenberg and Herremans, 1995). Informal controls may also support the management of conflict with an external stakeholder, as developing all the necessary formal policies and procedures to identify

appropriate behaviour in external relationships is challenging for companies (Falkenberg and Herremans, 1995). For these reasons, the attention and commitment of employees on H&S issues promoted by H&S informal controls may become a factor driving companies' responses to external stakeholders' demands. Thus, the following hypothesis is proposed:

H6. H&S informal controls are positively associated with the integration of H&S issues into external stakeholder relations.

3.3 The relationship between external stakeholder relations and business practices (H7)

Business practices may guide the integration of H&S issues into productivity, operations and innovation. However, the integration of H&S issues into business practices depends on more than the internal design process carried out by management. It may also be influenced by external requests such as customer requirements for product safety or by national and international H&S regulations (Passetti *et al.*, 2014). In the absence of specific mandatory regulations or where there are weak regulations, the pressure from external stakeholders may lead to partial responses related to H&S issues that are detached from companies' internal business practices. In such cases, H&S issues may be only used to project a legitimate image for the organisation, but with no substantial integration or impact on the overall H&S performance (O'Neill *et al.*, 2016). While a ceremonial response is theoretically possible, it is short term, myopic and may be counterproductive, considering the severe individual and societal issues related to H&S (Frey *et al.*, 2014). Integrating H&S issues into business practices through the pressure coming by external stakeholders can, therefore, help to avoid economic, social and legal problems and increase awareness of H&S in the organisations (Ditillo and Lisi, 2016). For these reasons, achieving integration of H&S issues is likely to require substantial business practices that are shaped by external stakeholder relations. This leads to the formulation of the following hypothesis:

H7. The integration of H&S issues into external stakeholder relationships positively influences the integration of H&S issues into business practices.

3.4 Interdependence between H&S control mechanisms (H8–H9)

A complementarity perspective is taken to examine the relationship between H&S action controls, results controls and informal controls. Interdependence is hypothesised in relation to the effect of H&S control mechanisms on the integration of H&S issues into business practices and external stakeholder relations. The notion of complementarity addresses issues related to control mechanisms as a system because it addresses how an organisational decision-maker can maximise performance by simultaneously making decisions about many control mechanisms in order to achieve a better control (Grabner and Moers, 2013).

A report of the HSE indicates that "Whatever the cause, situations that should have been identified are often missed because a systematic approach has not been used. It is difficult to incorporate the changes required to deal with the late identification of hazards after the design process has begun, and more difficult and expensive to make such changes later in the life of the control system" (2003, p. 4). The report underlines the importance of proactive and system integration of H&S issues into different technical production aspects in order to reduce the number of accidents and injuries.

H&S action controls and informal control mechanisms may complement each other, promoting the integration of H&S issues. Informal controls may help create a work environment that facilitates the acquisition of bottom-up information needed to make action controls work more effectively, and bring about the integration of H&S into business practices. Action controls require information to define and communicate H&S objectives and targets, which may be acquired merging top-down analysis with informal suggestions.

Operational employees and unit-level managers may use informal controls for integrating H&S issues in operational improvement, working practices innovation and productivity analysis, facilitating multidimensional analysis, comprehensive communication and the sharing of multiple experiences. While informal controls are useful, they may not be sufficient if the aim is to fully integrate H&S issues in business practices and go beyond a compliance approach. They must be supported by H&S action controls, which define specific H&S management responsibilities at different organisational units and levels, fostering goal congruence and H&S organisational commitment on H&S. From the above discussion, the following hypothesis is developed:

H8a. H&S action and H&S informal controls strengthen each of their effects on the integration of H&S issues into business practices.

The joint use of action controls and informal controls may also support the integration of H&S issues into external stakeholder relations. Their joint use may prompt the identification, communication, implementation and achievement of H&S objectives, targets, actions and information sharing related to external stakeholders. While action controls define formal activities such as committee meetings, complementing these with informal controls enables them to share also better information, experience, and stories that further enhance attention to external stakeholders and related H&S issues. Informal controls serve, therefore, to legitimate and integrate the formal actions defined by the management and to reinforce them. It provides management with a broader range of up-to-date information that guides timely formal decisions and actions aimed at integrating H&S issues with external stakeholder relationships (Kreutzer *et al.*, 2016). The following hypothesis is proposed:

H8b. H&S action and H&S informal controls strengthen each of their effects on the integration of H&S issues into external stakeholder relations.

Also, H&S results controls and H&S informal controls may complement each other supporting the integration of H&S issues into business practices. The relevance of formal objectives and resources allocation defined in the results controls may be valorised and reinforced by informal discussion, feedback and communication. The joint use of these control mechanisms may reduce uncertainties about which are the most relevant aspects and how to integrate H&S issues into operational improvement, working practices and productivity analysis. Employees and managers need to discuss performance also informally, and this activity is supported by informal controls (Das *et al.*, 2009; Turner and Makhija, 2006). Informal controls may also inform the future H&S targets, helping to integrate H&S issues into different business practices and related resource allocation processes. The formal support of H&S result controls for the integration of H&S issues into business practices may enhance safety commitment across the entire organisation and coordination between the different units, and this is reinforced by H&S informal controls that operate at a local level to share the importance of H&S objectives and targets. Consequently, the following hypothesis is developed:

H9a. H&S results and H&S informal controls strengthen each of their effects on the integration of H&S issues into business practices.

Integration of H&S issues with external stakeholder relationships may be enhanced by a complementarity effect between H&S results controls and H&S informal controls. The results controls make it possible to plan stakeholder relationships, alongside resource allocation and performance measurement. Informal controls support the planning system and the organisational objectives related to external stakeholders, contributing towards a safety culture and safety climate (Bouten and Hoozée, 2016). Informal controls may support information sharing about how to deal with external stakeholders and also inform critical

H&S issues and performance measurement (Parker and Chung, 2018). Together with results controls, they support a work environment that legitimates the importance of H&S issues, reinforcing their priority in different organisational units.

The joint use of the two H&S control mechanisms may also resolve potential conflicts with external stakeholder expectations about H&S issues. For example, labour unions are interested in issues of employee H&S, while customers are more interested in product safety issues (Sundin *et al.*, 2010). A complementarity use of controls may help to identify and prioritise the most critical H&S issues for each external stakeholders, and support integration. The following hypothesis is proposed:

H9b. H&S results and H&S informal controls strengthen each of their effects on the integration of H&S issues into external stakeholder relations.

3.5 The relationships between management actions and H&S performance (H10–H11)

Improving H&S performance is crucial for companies because it reduces near-misses and the frequency and gravity of employee accidents. The integration of H&S issues into business practices may enhance H&S performance. It may foster a safety culture and safety climate and enable alignment of individual worker beliefs and values with the organisation's mission, practices and production processes, generating motivation and commitment and avoiding simple compliance with H&S regulations (De Koster *et al.*, 2011; Pagell *et al.*, 2015). Through the integration of H&S issues, workforce well-being is improved, and worker engagement encouraged, leading to better H&S performance. The integration of H&S issues makes it easier to perform operational tasks and remove safety hazards, allowing workers to be more productive as they operate in a safer work environment (Pagell *et al.*, 2014, 2015). Accordingly, a positive relationship between the integration of H&S issues in business practices and H&S performance is desirable, leading to the following hypothesis:

H10. The integration of H&S issues into business practices is positively associated with H&S performance.

Also, the integration of H&S issues into external stakeholder relationships may enhance H&S performance. Stakeholder criticism may be translated into knowledge and understanding of the most relevant H&S issues facing a company. Integration may influence an organisational unit's tasks, employee behaviour and attitudes, supporting both safety culture and safety climate and ensuring better H&S performance (Zhao *et al.*, 2016). The integration may also support H&S related risk management since it can provide additional information on the most critical H&S risks a company faces. The processes of receiving, documenting and responding to external stakeholders may be supported and incentivised focusing attention on H&S issues and H&S performance improvement (Boesso *et al.*, 2013; Gunarathne *et al.*, 2016). As some external stakeholder relationships are vital, the company's objectives for H&S will be emphasised, and H&S performance will be monitored further in order to satisfy their requirements. All these aspects improve H&S performance, as the company gives them more attention. From the above arguments, the following hypothesis is proposed:

H11. The integration of H&S issues into external stakeholder relations is positively associated with H&S performance.

4. Method

The sample, data collection and measurement of constructs are considered in the following sub-sections.

4.1 Sample and data collection

A survey targeted at a sample of Italian companies operating in a variety of industries is used to collect the data and test the hypotheses. A non-random purposive sampling strategy is applied to identify the appropriate set of companies. Purposive sampling is a non-probability method. The elements to include are chosen by the researcher to meet their specific purpose, which results in saving time and money. It is applied in order to maximise “the likelihood that the resulting sample exhibits the variation in the independent variable(s) necessary to examine the hypotheses with sufficient power” (Van der Stede *et al.*, 2006, p. 463). Management control literature uses it for sampling companies (Van der Stede *et al.*, 2006). It also fits with the general aim of the study, namely testing hypotheses and not generalising sample characteristics to a population (Speklé and Widener, 2018).

Fernández-Muñiz *et al.* (2014) find that companies with fewer than 50 employees are more reluctant to participate in H&S survey research. In order to ensure that organisations are large enough for the analysis of the different variables and that control mechanisms are sufficiently developed, the sample includes non-listed companies with at least 100 employees (Lisi, 2018). Firms reporting revenues of over €500 million are excluded, as surveying one person about organisational practices in companies with high revenues may be problematic because he or she may not fully know the overall practices and mechanisms implemented (Widener, 2007). The sample is selected from the Who’s Who database and consists of 1,500 companies operating in different manufacturing and service industries. All were autonomous entities. The banking and insurance sectors are excluded as they have a low level of H&S risk, according to the Italian National Institute for Insurance against Accidents at Work (Istat, 2014).

Respondents were asked to complete the questionnaire on-line. They were H&S managers or the person responsible for H&S management in the company. As highlighted by Fernández-Muñiz *et al.* (2014, p. 298), H&S managers, “occupy an intermediate position between the management and the workers, and since the authors required information from both parties they considered that the information that this manager could give would be less biased and more accurate. This manager is also responsible for carrying out risk control and safety activities, so they are the organisation member with the most information about the specific practices and procedures being carried out in the firm. They also have access to all types of information concerning harm to workers’ health”.

Other scholars have widely used the choice of a single-informant approach both in H&S management (Fernández-Muñiz *et al.*, 2009, 2014) and management control (Bedford and Malmi, 2015; Lisi, 2018). It is used in this paper because, first, the H&S managers are called to manage different and critical H&S issues that may cause severe economic, social and legal problems. They are accountable to different internal and external stakeholders for the topic(s) discussed, and should be less influenced by social desirability bias. Second, the use of multiple methods of measurement and reliance on more than one respondent per observation, even if desirable, is not always feasible, and does not necessarily solve the problem of desirability bias (Speklé and Widener, 2018). The choice of H&S manager made it possible also to avoid informant bias [1].

Following Dillman (2000), an initial email was sent in the spring of 2016 to alert the respondents to the study. It was followed by an email containing a link to the web questionnaire. There were two further follow-up emails between May and June 2016. The name of each respondent and company were confidential. A total of 113 companies (7.53%) returned the questionnaires. Five were eliminated because they were incomplete. The complete dataset has 108 responses with a final response rate of 7.20%. Previous studies on H&S management have higher response rates, although they are based on mail questionnaires (Fernández-Muñiz *et al.*, 2007). According to Fan and Yan (2010), internet-based questionnaires have an approximately 10% lower rate than mail questionnaires, as in

this survey. In the management control literature, response rates vary from 10% (Pondeville *et al.*, 2013) to around 30% (Lisi, 2018). As statistical sampling was not necessary for the study, the response rate was not significant *per se*. However, it may affect the validity of the respondent sample and the interpretation of the related findings due to possible bias (Speklé and Widener, 2018).

The validity of the data was therefore analysed by testing for non-response bias. A *t*-test comparison between the respondent and the initial sample and late respondent companies' profiles, respectively, i.e., size and industry, did not reveal any significant differences (Table 1). Response bias was also explored by splitting the sample into early and late respondents. A second *t*-test of the size and average experience does not reveal any significant difference ($p < \text{not significant}$). These results indicate that non-response bias was not a significant concern for this sample. The average experience of 11 years of the respondents indicates adequate knowledge and understanding to respond to the questionnaire.

4.2 Measurement of the constructs

H&S Action controls, *Results controls* and *Informal controls* were each measured by items adapted from previous literature and were available for details (Table A1). Previous quantitative management control does not consider H&S issues, and therefore, a survey protocol was not available. The H&S (accounting) literature does not explicitly address the topic of action controls, results controls and informal controls in previous surveys. Previous items that express the indicated control mechanisms were adapted to the H&S context, inserting an explicit mention of H&S whenever possible. It was made clear to respondents that the focus was on H&S issues and the related use of control mechanisms in organisations. A new item (one of four) was added in the case of H&S result controls to underline the role of budget and critical performance in the context of H&S. All the items concerning H&S action and informal controls were adapted from the previous instruments available.

Action controls measure a set of mechanisms that define the actions that are desirable and can ensure that managers and employees pay attention to H&S. The construct of *Results controls* was measured as the extent to which the company and its managers rely on and follow up H&S planning activities and performance assessment at different stages of analysis. *Informal controls* measured managers' and employees' participation and collaboration in informal discussion and promotion of H&S issues at different levels.

	Respondents (<i>n.</i> 108)	Initial sample (<i>n.</i> 1,500)	Early respondents (first quartile)	Late respondents (last quartile)
Company average size (<i>n.</i> employees)	Mean value: 649	Mean value: 732	Mean value: 636	Mean value: 700
Background respondents	65% degree or higher 35% high school diploma	Not available	69% degree or higher 31% high school diploma	64% degree or higher 36% high school diploma
Average experience	11 years	Not available	13 years	9.6 years
Respondents' position	90% H&S manager 10% HR manager	85% H&S manager 15% HR manager	92% H&S manager 8% HR manager	87% H&S manager 13% HR manager
% Industries (SIC code)	40.2% (20–39) 47.8% (40–49) 12% (50–59)	41.9% (20–39) 43.8% (40–49) 14.3% (50–59)	43.1% (20–39) 45.7% (40–49) 11.2% (50–59)	38.5% (20–39) 49.2% (40–49) 12.3% (50–59)

Note(s): 20–39 manufacturing; 40–49 transportation and utilities; 50–59 wholesale and retail

Table 1.
Sample characteristics

To test for complementarity, and related internal consistency between management control mechanisms may use either a demand function or a pay-off function (Grabner and Moers, 2013). Pay-off functions are used to assess if the performance effect of a control mechanism depends on the use of (some) other control mechanisms and vice versa. Estimating pay-off functions is suitable “when it involves relatively new practices and technologies that require experimentation” (Masschelein and Moers, 2020, p. 2) as is the case for H&S control mechanisms. In a path model, pay-off functions can be estimated using a product approach with mean centred variables. The interdependence between the H&S control package mechanisms is modelled as a product term between H&S actions controls and H&S informal controls and between H&S results control and H&S informal controls, respectively, in order to test whether a system approach to management control is present (Müller-Stewens *et al.*, 2020; Gerdin and Greve, 2008).

As there is no dedicated instrument in the literature for examining the integration of H&S issues, the items used to measure *Business practices* and *External stakeholder relations* were developed and adapted from the literature (Table A1). The construct of business practices was measured across four items, which addressed innovation, integration, operational improvement and productivity. It was developed from Koufteros *et al.*'s (2014) measurement of operational capability in order to explicitly address how the integration of H&S issues within different business practices takes place. Some modifications to the wording and set-up of the question were made to ensure a proper fit with H&S issues and with respondents' organisational contexts and frames of reference.

For a similar reason, the instrument about external stakeholder relations, which indicates whether H&S issues are integrated with external stakeholder relations, was developed, taking into consideration previous literature. An explicit indication of H&S importance in the context of different stakeholder relations was underlined. Given the multitude of external stakeholders, the focus was on those that best fit with H&S. Three new stakeholder items were created, while two items were taken from previous literature. Five-items composed the final instrument. Details are reported in Table A1.

There is no explicit agreement about the content of *H&S performance* because it is a multidimensional concept. O'Neill *et al.* (2013; 2015) criticise “lost time injury” measures, considering them neither valid nor reliable measures of safety, and therefore, inappropriate for informing managers, boards and external stakeholders. They suggest that indicators should be developed that focus more on employee issues and not only on those institutional H&S issues that are required by norms (see also Cooper *et al.*, 2011 for a similar discussion). Accordingly, this study defines H&S performance as the capacity to increase both employee safety and the related organisational aspects and focuses on different and multiples aspects that meet and even exceed the multiple expectations concerning H&S. This broad definition considers both company and employee issues, viewing them as mutually developing and interrelated.

Additionally, as Fernández-Muñiz *et al.* (2007; 2009) pointed out, measuring H&S performance requires certain assumptions. Objective data is problematic because it is sensitive, its accuracy may be dubious, it is retrospective and it tends to ignore risk exposure and to be very unstable over time. The construct was measured using self-reported data, following the literature. A measurement instrument of five items was developed. Three items were taken from the previous literature, while two new items were added in order to develop a complete understanding of H&S performance (Table A1). The respondents indicated the extent to which their organisation achieved a set of H&S performance levels over the previous three years (from 1: not at all, to 7; to a very great extent).

The control variables employed were *Size*, *Industry* and *H&S Investments*. Size may influence organisational choices, as larger companies are more likely to adopt sophisticated control mechanisms (Lisi, 2018). The natural logarithm of the number of employees was used

to measure company size. The industry may influence management control mechanisms choices. The industry was measured with a dummy variable, with manufacturing = 1 and non-manufacturing = 0, following Lisi (2018). A key determinant of corporate social performance is the Investments (Testa *et al.*, 2016). The level of resources (time, people and percentage of budget) dedicated to H&S management in the previous three years was measured using a categorical variable (0 if decreased; 1 if stable; 2 if increased). A list of eleven types of investment was provided to give a complete set of H&S investments (Table A2). The mean aggregate was used as a proxy for the variable in the path model.

An Italian Foundation specialising in H&S management, two academic experts in management control, one academic expert in H&S management and two H&S managers were involved in pre-testing the survey to reduce the vagueness, complexity and social desirability of all items. This check resulted in minor changes in the wording of some items and some changes to the measurement scale of two questions. The full questionnaire is shown in Table A2.

The psychometric properties of the measurement scales were assessed before including them in the PLS measurement model. The Bartlett test of sphericity showed a significance level of 0.000 for all the variables indicating the absence of non-zero correlations. The Kaiser-Meyer-Olkin test was above 0.91. Its value close to 1 indicates that sample adequacy of the data that are to be used in PLS-SEM factor analysis is fine. The ex-ante and ex-post analyses carried out to assess common method variance bias showed the absence of specific biases [2].

5. Findings

The data was analysed using PLS-SEM and SmartPLS 3 for easy access (Hair *et al.*, 2017). Power tests were conducted before testing the measurement and structural models to assess whether the sample size was sufficiently large to conduct reliable PLS-SEM analyses (Cohen, 1992; Faul *et al.*, 2007; Green, 1991). The tests indicate that the sample size enables a sufficient power to estimate the model in PLS [3]. The distribution of each variable based on kurtosis and skewness, along with visual inspections, showed a normal distribution. The descriptive statistics are given in Table 2.

5.1 Measurement model: assessing psychometrics of the multi-item variables

The psychometric properties of the proposed measurement model were tested. Convergent validity (outer loading and average variance extracted), internal consistency validity (composite reliability and Cronbach's Alpha), and discriminant validity (Heterotrait-Monotrait-ratio, HTMT), met the recommended values (Hair *et al.*, 2017, 2018), as indicated in Table 3.

The root square of AVE was in line with those indicated in the literature (Hair *et al.*, 2017) [4]. The analysis of cross-loadings (Table 4), which further tests discriminant validity, reported

Variable	Mean	Median	Standard deviation	Min	Max	Range
H&S action control	4.70	5.00	1.35	2.00	7.00	5.00
H&S informal control	4.60	4.00	1.42	1.50	7.00	5.50
H&S results controls	4.23	4.00	1.52	2.00	7.00	5.00
H&S performance	3.86	5.00	1.49	1.60	6.60	5.00
Business practices	4.10	4.00	1.35	2.25	7.00	4.75
External stakeholder relations	4.01	4.00	1.35	2.00	7.00	5.00

Table 2.
Descriptive statistics ($n = 108$)

Table 3.
Main constructs
theoretical validity

Variable	Items	Outer loading (>0.70)	Convergent validity AVE (>0.50)	Internal consistency Composite reliability (>0.60)	Cronbach's alpha (0.60-0.95)	Discriminant validity HTMT confidence interval does not include 1
H&S action controls	Formal channels communication	0.830	0.690	0.899	0.851	Yes
	Plans and manuals	0.836				
	Managerial responsibilities	0.866				
H&S informal controls	Workers suggestions	0.889	0.683	0.895	0.844	Yes
	Staff units suggestion	0.931				
	Informal discussion	0.725				
H&S performance	Managers autonomy	0.740				
	Employee injuries	0.757	0.682	0.915	0.883	Yes
	Risks assessment	0.827				
	Normative violations	0.838				
	Material damage	0.876				
	Employees absenteeism and lost time reduction	0.827				
Business practices	Working practices innovation	0.928	0.853	0.959	0.943	Yes
	Integrated solutions	0.925				
	Operational improvements	0.931				
	Employees safety at an operational level	0.911				
External stakeholder relations	Suppliers	0.769	0.686	0.916	0.885	Yes
	Local community	0.891				
	Labour unions	0.787				
	National institutions	0.882				
	Supervisory organisms	0.805				
H&S results controls	Incentive system related to targets	0.776	0.672	0.891	0.837	Yes
	Performance evaluation and monitoring	0.873				
	H&S objectives within the planning system	0.869				
	Critical performances and budget process	0.753				

	H&S action controls	H&S informal controls	H&S performance	Business practices	External stakeholder decisions	H&S results control
Formal channels communication	<i>0.830</i>	0.520	0.448	0.503	0.621	0.539
Plans and manuals	<i>0.836</i>	0.519	0.503	0.493	0.638	0.483
Managerial responsibilities	<i>0.866</i>	0.541	0.488	0.499	0.614	0.522
Workers suggestions	0.628	<i>0.889</i>	0.505	0.698	0.593	0.577
Staff units suggestion	0.686	<i>0.931</i>	0.508	0.684	0.673	0.564
Informal discussion	0.500	<i>0.725</i>	0.270	0.433	0.379	0.342
Managers autonomy	0.521	<i>0.740</i>	0.352	0.522	0.532	0.414
Employee injuries	0.416	0.387	<i>0.757</i>	0.395	0.482	0.414
Risks assessment	0.589	0.471	<i>0.827</i>	0.542	0.586	0.556
Normative violations	0.390	0.378	<i>0.838</i>	0.422	0.509	0.467
Material damage	0.477	0.444	<i>0.876</i>	0.504	0.551	0.435
Employees absenteeism and lost time reduction	0.489	0.429	<i>0.827</i>	0.439	0.531	0.441
Working practices innovation	0.572	0.614	0.464	<i>0.928</i>	0.591	0.630
Integrated solutions	0.601	0.615	0.453	<i>0.925</i>	0.603	0.636
Operational improvements	0.673	0.719	0.589	<i>0.931</i>	0.666	0.716
Employees safety at operational level	0.665	0.707	0.544	<i>0.911</i>	0.658	0.644
Suppliers	0.586	0.553	0.556	0.674	<i>0.769</i>	0.571
Local community	0.595	0.506	0.474	0.605	<i>0.891</i>	0.577
Labour unions	0.455	0.526	0.416	0.526	<i>0.787</i>	0.432
National institutions	0.488	0.431	0.419	0.542	<i>0.882</i>	0.479
Supervisory organisms	0.443	0.390	0.424	0.572	<i>0.805</i>	0.355
Incentive system related to targets	0.585	0.432	0.446	0.394	0.450	<i>0.776</i>
Performance evaluation and monitoring	0.632	0.493	0.564	0.533	0.478	<i>0.873</i>
Objectives within the planning system	0.674	0.582	0.588	0.696	0.553	<i>0.869</i>
Critical performances and budget process	0.622	0.675	0.495	0.567	0.457	<i>0.753</i>

Table 4. Primary constructs discriminant validity assessment (Cross-loadings analysis)

reliable results as each indicator's outer loading on the associated construct was higher than any of its cross-loadings (its correlation) on other constructs (Hair *et al.*, 2017). A confirmatory tetrad analysis (CTS) was run to test the validity of the measurement model further, and in particular, of the reflective constructs (see Hair *et al.*, 2018). The results (not tabulated due to maximum article length possible) indicate that each tetrad (a tetrad being the difference between the product of one pair of covariances and the product of another) vanished. The related upper and

lower bounds of the 90% bias-corrected and Bonferroni-adjusted intervals were zero for the confidence intervals of all tetrads, indicating the validity of the reflective measurement model specification (Hair *et al.*, 2018) [5].

5.2 Structural model: hypotheses tests

A PLS structural model was estimated to test the hypotheses using Consistent PLS Algorithms within Smart PLS-SEM (Hair *et al.*, 2017). The proposed model (Model I) showed appropriate goodness of fit indices and can be considered satisfactory. The model I did not consider complementarity analysis for testing H8a, b and H9a, b. The VIF values for all the predictor constructs were below the threshold value of 5, suggesting that collinearity among the constructs does not threaten the robustness of the findings. The R^2 value measures the model's predictive power focusing on endogenous variables. The findings indicate that H&S Performance (0.412), and External stakeholder relations (0.430) have values close to the moderate level while Business practices (0.682) has a moderate-substantial value. The Q^2 value reveals the predictive relevance of the model. All of the values are greater than zero, confirming the predictive validity of the model. Table 6 shows the results of Q^2 and the path coefficients with their significance levels.

The researchers used the Consistent PLS Bootstrapping procedure with 5,000 samples to assess the significance of the path coefficients (Table 5). Hypothesis 1, which predicted a positive influence of H&S Action controls on Business practices, is rejected. In contrast with that, Hypothesis 2, which predicted a positive influence of H&S Results controls on Business practices, is supported with $p < 0.05$. Hypothesis 3 is also statistically supported, indicating that H&S Informal controls are significantly and positively linked to Business practices with $p < 0.01$. H&S Action controls influenced External stakeholder relations with $p < 0.05$, confirming Hypotheses 4. However, Hypothesis 5 is rejected because H&S Results controls did not positively influence External stakeholder relations. Hypotheses 6, concerning the influence of H&S Informal controls on External stakeholder relations, is confirmed with $p < 0.05$ [6]. The positive influence of External stakeholder relations on Business practices (Hypotheses 7) is confirmed with $p < 0.01$. Moreover, Hypotheses 10 is confirmed, as Business practices positively influence H&S Performance with $p < 0.05$. Finally, Hypotheses 11 is confirmed. External stakeholder relations, even if weakly, positively influenced H&S Performance with $p < 0.10$. Among the control variables, Investments had a positive influence on H&S Performance, as did Sector but not Size. The Sector also had a positive influence on H&S Action controls, H&S Results controls and H&S Performance. Differences, therefore, exist between the manufacturing and the non-manufacturing sectors concerning the development of H&S control mechanisms.

Model II tested the above hypotheses together with the complementarity analysis between the different H&S control mechanisms. The findings were the same; the significant hypotheses remained significant while the others were still rejected. Only the variable Investments were no longer associated with H&S Performance. Because of the limited space, only the data about complementarity has been reported. The complementarity effects (H8a, b and H9a, b) are all rejected because there was not any significant fit between H&S Action and H&S Informal controls or between H&S Results and H&S Informal controls in shaping Business practices and External Stakeholder relations. These findings suggest that H&S control mechanisms at the sample level operate as a package and not a system due to the lack of interdependence effects [7].

The multi-group analysis (PLS-MGA) makes it possible to test if pre-defined data groups have significant differences in their group-specific parameter estimates (e.g. outer weights, outer loadings and path coefficients), and to understand if some hypotheses give different findings when the main sample is divided into sub-groups. The analysis has been conducted

Model I. Without complementarity analysis	Path to					
The path from (hypothesis number)	H&S action controls	H&S results controls	H&S informal controls	Business practices	External stakeholder relations	H&S performance
H&S action controls (H1 and H4)				(0.088)ns	(0.303)**	
H&S results controls (H2 and H5)				(0.176)**	(0.177)ns	
H&S informal controls (H3 and H6)				(0.349)***	(0.273)**	
External stakeholder relations (H7 and H11)				(0.342)***		(0.218)*
Business practices (H10)						(0.260)**
<i>Size</i>	<i>(0.268)ns</i>	<i>(0.193)ns</i>	<i>(0.106)ns</i>	<i>(0.150)ns</i>	<i>(0.114)ns</i>	<i>(0.122)ns</i>
<i>Sector</i>	<i>(0.203)**</i>	<i>(0.231)**</i>	<i>(0.119)ns</i>	<i>(0.184)ns</i>	<i>(-0.031)ns</i>	<i>(0.290)**</i>
<i>Investments</i>						<i>(0.234)**</i>
R^2	–	–	–	0.739	0.538	0.475
Stone-Geisser's Q^2	–	–	–	0.566	0.296	0.266
Model II. Focus on complementarity analysis						
H&S action controls × H&S informal controls (H8a)				(-0.076)ns		
H&S action controls × H&S informal controls (H8b)					(0.067)ns	
H&S results controls × H&S informal controls (H9a)				(0.114)ns		
H&S results controls × H&S informal controls (H9b)					(0.055)ns	

Note(s): $N = 108$; the coefficient is significant at the * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ using a two-tailed test; ns = no significant; *Italic style* denotes control paths

Table 5.
PLS structural model:
path coefficients, t-
statistics, R^2 and Q^2

taking into consideration two variables to split the 108 respondents companies: size and H&S performance. The PLS-MGA based on size (large vs small) does not show any significant difference between the groups. The PLS-MGA based on H&S performance, comparing companies with higher H&S performance (that were less than half of the whole sample) with the whole sample, produced different and novel findings. Three complementarity effects were detected, indicating a positive and significant association, while the other relationships remained not significant. First, the H&S Action controls, combined with H&S Informal controls, had a positive (weak) effect on Business practices with $p < 0.10$. Second, the interdependence between H&S Results controls and H&S Informal controls lead to higher

Table 6.
Summary of the
hypotheses

Hypothesis	Association
H1: H&S action controls → Business practices	Not confirmed
H2: H&S results controls → Business practices	Confirmed
H3: H&S informal controls → Business practices	Confirmed
H4: H&S action controls → External stakeholder relations	Confirmed
H5: H&S results controls → External stakeholder relations	Not confirmed
H6: H&S informal controls → External stakeholder relations	Confirmed
H7: External stakeholder relationships → Business practices	Confirmed
H8a: H&S action controls x H&S informal controls → Business practices	Not confirmed
H8b: H&S action controls x H&S informal controls → External stakeholder relations	Not confirmed
H9a: H&S results controls x H&S informal controls → Business practices	Not confirmed
H9b: H&S results controls x H&S informal controls → External stakeholder relations	Not confirmed
H10: Business practices → H&S Performance	Confirmed
H11: External stakeholder relationships → H&S Performance	Confirmed

Business practices with $p < 0.01$. Finally, H&S Results controls and H&S Action controls lead to higher Business practices with $p < 0.01$. These three positive effects indicate that, at least for a sub-sample of companies, some complementarity effects and internal consistency between the formal and informal control mechanisms were present. The positive effects of H&S Action controls drove these effects controls on Business practices with $p < 0.01$ (at sample level the same *Hypothesis 1* was rejected) and also by the effect of H&S Results controls on Business practices with $p < 0.01$ (at sample level $p < 0.05$). These findings indicate that higher performance companies implement their H&S control mechanisms more effectively, which produces a more substantial effect on the integration of H&S issues into business practices, but not in external stakeholder relationships. In this specific case, the H&S control mechanisms, at least partially, followed a system approach.

The model was also run three times after removing H&S Action controls, H&S Results controls and H&S Informal controls, respectively. Some specific findings changed. The most important was that the influence of H&S Results controls on Business practices was significant with $p < 0.05$, and the influence of H&S Action controls on Business practices was significant with $p < 0.01$ in the absence of H&S Informal control in the model. The omission of H&S Informal controls leads, therefore, to a misspecification of the entire framework of control and biased findings. Additional analyses were conducted to test the hypotheses, and the initial findings were confirmed [8].

6. Discussion

The analysis shows that H&S action controls, results controls and informal control mechanisms, to varying extents, affect the integration of H&S issues in two management actions that, in turn, influence H&S performance (Table 4). Among them, H&S results controls do not influence external stakeholder relations. A possible explanation may be the lack of control of the relations by the companies and the changing nature of the relationship itself. Also, the lack of influence of H&S action controls on business practices needs future insights. Indeed, the lack of influence reported means that adopting H&S procedures and communication, as well as establishing specific roles and responsibilities in managing H&S, creates no stimulus to the innovation of working practices nor improvement to employees' operational safety. Action controls may be less critical in those organisations with high H&S performance (that is zero accidents and very low H&S risks) since H&S has become a critical success factor for the organisations. However, this does not seem to be the case for the sample of companies analysed in which H&S performance showed a low-medium level. The H&S

action controls were, therefore, partially unable to drive the integration of issues for most of the companies analysed.

The paper offers three main interdisciplinary contributions to management control, sustainability management control and H&S accounting literature. The first is the importance of the informal control mechanisms in the management control package. The paper shows that H&S informal control mechanisms are the only mechanism able to influence both business practices and external stakeholder relations, adding empirical evidence to Tucker's (2019) and Otley's (2016) argumentation concerning critical informal controls importance. The empirical pieces of evidence have revealed that without informal controls analysis, the understanding of the management control package is partial and may lead to incomplete and potentially biased assessments.

These findings add to management control literature that has started to analyse informal controls in the control package (Gerdin *et al.*, 2019; Laguir *et al.*, 2019; Van der Kolk *et al.*, 2019). They revealed the importance of comprehensive management control design if the aim is to understand the functioning of the management control package fully, its several effects, implications and also the issue of internal consistency between formal and informal control mechanisms (Chenhall, 2003; Otley, 2016; Tucker, 2019) (see Table 6).

This paper extends the previous sustainability management control literature, directly responding to several calls for in-depth H&S control mechanisms analysis (Bouten and Hoozée, 2016; Caicedo and Mårtensson, 2010). It presents a more comprehensive analysis of which kind of control mechanisms companies use to integrate H&S issues, as previous literature does not explicitly recognise differences between types of control, e.g. action, results and informal controls, to the extent found in this paper.

As the findings revealed, companies used different H&S control mechanisms to both proactively search the alignment with external stakeholders' issues in addition to internalise their instances and to integrate H&S issues into business practices. Both business practices and external stakeholder relations enhance H&S performance, indicating that H&S performance improvement depends on both internal and external aspects. The paper completes the previous literature focused on H&S external reporting adding an internal perspective of analysis that has been largely neglected (Amernic and Craig, 2017; Evangelinos *et al.*, 2018; O'Neill *et al.*, 2015a, 2016).

The second main contribution concerns the analysis of system vs package approach to management control and the related issue of internal consistency between formal and informal control mechanisms, focusing on a specific sustainability issue. The finding adds to several calls concerning the analysis of system vs package approach between sustainability management control mechanisms showing two main things (Casey *et al.*, 2017; Crutzen *et al.*, 2017; Ditillo and Lisi, 2014; Durden, 2008). At the sample level, the companies do not follow a systematic approach in designing H&S control mechanisms. Only companies with higher H&S performance show some interdependence among H&S control mechanisms. These two things contribute to the discussion advanced by Bouten and Hoozée (2016), revealing that a system approach to H&S control is a requisite for only the best companies. The findings extend previous H&S control studies that did not provide a precise analysis of the topic (Bouten and Hoozée, 2016; Caicedo and Mårtensson, 2010).

It may be possible to explain why, in most companies, the internal consistency between H&S control mechanisms is not present, and therefore of why companies follow a package approach. Despite the potential synergies hypothesised, the design and implementation of different H&S control mechanisms take time and effort, hindering complementarity. H&S is influenced by individual, organisational and also institutional aspects, and in turn, influences physical, cognitive and behavioural aspects. Such complexity may create challenges for companies when they define H&S targets, measure performance, align employees behaviour and disseminate information through organisational units because, given the complexity to

the topic, they cannot control them entirely, and this may hinder the development of complementarity. The lack of complementarity may also be caused by disagreements between companies and employees about H&S choices, and by the responses of employees to the top-down design choices (Das *et al.*, 2009).

Additionally, it may be caused by the use of informal controls as a protection mechanism rather than as an alignment mechanism with other control mechanisms in most of the companies. Employees may not report, in some circumstances, minor injuries, hazards or near misses, using informal control mechanisms as a type of self-protection in order to avoid penalties or sanctions. Control mechanisms may be designed and implemented by different people, in different parts of an organisation, at different times, hindering a rationale and system design upon which complementarity is based (Demartini and Otley, 2019). Despite such potential barriers, the internal consistency between formal and informal controls and the related complementarity effects was partially present in a subset of companies.

The third main contribution concerns H&S accounting literature, which has mainly examined technical and accounting control mechanisms as a way to prompt H&S integration (Fernández-Muñiz *et al.*, 2007; Gunarathne *et al.*, 2016; Heras-Saizarbitoria *et al.*, 2019; Passetti and Battaglia, 2020; Tappura *et al.*, 2015). The present paper brings together different technical, organisational and behavioural aspects of control mechanisms and H&S making it possible to test the broader O'Neill and Wolfe's (2017) model empirically for the first time. By incorporating in the model, action controls and results control (left side concerning technical and governance controls) and informal controls (right side concerning cultural controls), the paper has extended it, also providing a detailed analysis of different H&S control mechanisms effects and effectiveness.

The design and use of a comprehensive set of controls, not only related to technical safety aspects to prompt the integration of H&S issues and related performance, seem to be an essential choice by the organisations. The centrality of H&S informal controls provides evidence that supports previous claims in the H&S literature concerning the relevance of both safety culture mechanisms and safety climate mechanisms in shaping the integration of H&S issues and H&S performance (Guldenmund, 2010; Schneider *et al.*, 1996; Zohar, 2010).

7. Conclusions

This paper provides an in-depth interdisciplinary analysis of the effectiveness of different control mechanisms in the context of H&S. This topic has received little prior investigation, despite the importance of H&S control mechanisms for safer work environments and the sustainability of societies, organisations and the economy. The study shows that analysis of informal controls, in addition to results controls and action controls, as well as internal consistency between formal and informal control mechanisms, are necessary for a complete understanding of a management control package.

This paper provides practical implications for managers and policymakers. For managers, it suggests the control mechanisms, the specific types of management actions and the related relationships that may enhance the integration of H&S issues and improve performance. Managers may consider that while a single control mechanism does not adequately protect workers and affect the integration of H&S issues, the development of a set of different formal and informal controls appears to be necessary conditions for control of healthy workplaces. The relevance of H&S issues is also destined to increase, given the imperative to develop safer work environments related to potential pandemic threats. Managing complexity in healthy crises, such as that of the COVID-19, requires H&S formal and informal controls that can support and affect a prompt, shared and effective organisational response to an emergency.

For policymakers who aim to foster efficient and effective H&S policies, these findings point to the need to design balanced policy measures to stimulate the adoption of a correct mix of formal and informal controls in businesses. It should result in the integration of H&S issues into different business practices, taking into consideration external stakeholder relations and H&S performance.

This study has some limitations. The H&S performance measure could be replaced in future research by improved inter-subjectively testable information, although collecting H&S quantitative data is difficult. An additional limitation is the low response rate. The analysis of management actions could be further explored, with new or refined typologies. More specific control mechanisms could be analysed in the future to test complementarity effects. The analysis of different control mechanisms, including informal controls, requires additional analysis in order to deepen the issue of system vs package approaches and internal consistency between formal and informal control mechanisms. It could be useful to analyse H&S uncertainty, H&S strategy, H&S risk level and the types of H&S risk an organisation faces in order to link them with the design and functioning of an H&S control mechanism package (system). Future studies may investigate how companies develop and use their control mechanisms to embed H&S into decision making aspects using case analysis to confirm or disconfirm the present findings. The relationship between H&S control mechanisms and external disclosure could also be examined to discover synergies and trade-offs between internal management and the external communication of H&S information. In addition to employees' H&S issues, product H&S issues could also be investigated. Finally, the potential ambiguity that may surround H&S objectives, targets and performance assessment could be analysed.

Notes

1. Informant bias is the potential error that occurs when subjects report on others or on events at which they were not present. It occurs when the respondent is not an expert on the topic.
2. Details about ex-ante and ex-post analyses are available from the authors upon request.
3. Details about sample size power are available from the authors.
4. Details about the root square of AVE are available from the authors.
5. Details about confirmatory tetrad analysis are available from the authors.
6. The direct relationships between the three H&S control mechanisms and H&S performance were also tested, even though it does not appear in no hypotheses. The only significant positive finding was the influence of H&S Results controls on H&S Performance with $p < 0.05$ and a path coefficient of 0.317.
7. The analysis of interdependence between H&S Action and H&S Results controls and their influence on Business practices and External stakeholder relations was also conducted. The findings indicate a non-significant statistical relationship in both the cases (path coefficient of 0.007 and -0.011 , respectively), confirming that H&S control mechanisms tend to operate as a package.
8. Details are available from the authors upon request.

References

- Adler, P.S. and Borys, B. (1996), "Two types of bureaucracy: enabling and coercive", *Administrative Science Quarterly*, Vol. 41 No. 1, pp. 61-89.
- Amernic, J. and Craig, R. (2017), "CEO speeches and safety culture: British Petroleum before the Deepwater Horizon disaster", *Critical Perspectives on Accounting*, Vol. 47, pp. 61-80.
- Arjaliès, D.L. and Mundy, J. (2013), "The use of management control systems to manage CSR strategy: a levers of control perspective", *Management Accounting Research*, Vol. 24 No. 4, pp. 284-300.

- Barnett-Schuster, P. (2008), *Fundamentals of International Occupational Health and Safety Law*, Aberdeen University Press Services, Aberdeen.
- Battaglia, M., Passetti, E. and Frey, M. (2015), "Occupational health and safety management in municipal waste companies: a note on the Italian sector", *Safety Science*, Vol. 72, pp. 55-65.
- Battaglia, M., Passetti, E., Bianchi, L. and Frey, M. (2016), "Managing for integration: a longitudinal analysis of management control for sustainability", *Journal of Cleaner Production*, Vol. 136 Part A November, pp. 213-225.
- Bebbington, J. and Thomson, I. (2013), "Sustainable development, management and accounting: boundary crossing", *Management Accounting Research*, Vol. 24 No. 4, pp. 277-283.
- Bebbington, J. and Unerman, J. (2018), "Achieving the united nations sustainable development goals: an enabling role for accounting research", *Accounting, Auditing and Accountability Journal*, Vol. 31 No. 1, pp. 2-24.
- Bedford, D.S. and Malmi, T. (2015), "Configurations of control: an exploratory analysis", *Management Accounting Research*, Vol. 27, pp. 2-26.
- Boesso, G., Kumar, K. and Michelon, G. (2013), "Descriptive, instrumental and strategic approaches to corporate social responsibility", *Accounting, Auditing and Accountability Journal*, Vol. 26 No. 3, pp. 399-422.
- Bouten, L. and Hoozée, S. (2016), "Let's do it safely: how Altrad Balliauw configured a package of control systems", *Journal of Cleaner Production*, Vol. 136 Part A (November), pp. 172-180.
- Braumann, E.C., Grabner, I. and Posch, A. (2020), "Tone from the top in risk management: a complementarity perspective on how control systems influence risk awareness", *Accounting, Organizations and Society*, 101128 (in press).
- Bridoux, F. and Stoelhorst, J.W. (2014), "Microfoundations for stakeholder theory: managing stakeholders with heterogeneous motives", *Strategic Management Journal*, Vol. 35 No. 1, pp. 107-125.
- Broadbent, J. and Laughlin, R. (2009), "Performance management systems: a conceptual model", *Management Accounting Research*, Vol. 20 No. 4, pp. 83-295.
- Brown, K.A. (1996), "Workplace safety: a call for research", *Journal of Operations Management*, Vol. 14 No. 2, pp. 157-171.
- Burritt, R.L. and Schaltegger, S. (2010), "Sustainability accounting and reporting: fad or trend?", *Accounting, Auditing and Accountability Journal*, Vol. 23 No. 7, pp. 829-846.
- Caicedo, M.H. and Mårtensson, M. (2010), "Extensions and intensions of management control—the inclusion of health", *Critical Perspectives on Accounting*, Vol. 21 No. 8, pp. 655-668.
- Cardinal, L.B., Sitkin, S.B. and Long, C.P. (2010), "A configurational theory of control", in Sitkin, S.B., Cardinal, L.B. and Bijlsma-Frankema, K.M. (Eds), *Organizational Control*, Cambridge University Press, Cambridge, pp. 51-79.
- Cardinal, L.B., Kreutzer, M. and Miller, C.C. (2017), "An aspirational view of organizational control research: Re-invigorating empirical work to better meet the challenges of 21st century organizations", *Academy of Management Annals*, Vol. 11 No. 2, pp. 559-592.
- Casey, T., Griffin, M.A., Flatau Harrison, H. and Neal, A. (2017), "Safety climate and culture: integrating psychological and systems perspectives", *Journal of Occupational Health Psychology*, Vol. 22 No. 3, pp. 341-353.
- Chenhall, R.H. (2003), "Management control systems design within its organizational context: findings from contingency-based research and directions for the future", *Accounting, Organizations and Society*, Vol. 28 Nos 2-3, pp. 127-168.
- Christ, K.L., Rao, K.K. and Burritt, R.L. (2019), "Accounting for modern slavery: an analysis of Australian listed company disclosures", *Accounting, Auditing and Accountability Journal*, Vol. 32 No. 3, pp. 836-865.
- Cohen, J. (1992), "A power primer", *Psychological Bulletin*, Vol. 112 No. 1, pp. 155-159.

-
- Cooper, C., Coulson, A. and Taylor, P. (2011), "Accounting for human rights: doxic health and safety practices—The accounting lesson from ICL", *Critical Perspectives on Accounting*, Vol. 22 No. 8, pp. 738-758.
- Crilly, D. and Sloan, P. (2013), "Autonomy or control? Organizational architecture and corporate attention to stakeholders", *Organization Science*, Vol. 25 No. 2, pp. 339-355.
- Crutzen, N., Zvezdov, D. and Schaltegger, S. (2017), "Sustainability and management control. Exploring and theorizing control patterns in large European firms", *Journal of Cleaner Production*, Vol. 143, pp. 1291-1301.
- Das, A., Pagell, M., Behm, M. and Veltri, A. (2009), "Toward a theory of the linkages between safety and quality", *Quality Control and Applied Statistics*, Vol. 54 No. 5, pp. 561-565.
- De Jong, B.A., Bijlsma-Frankema, K.M. and Cardinal, L.B. (2014), "Stronger than the sum of its parts? The performance implications of peer control combinations in teams", *Organization Science*, Vol. 25 No. 6, pp. 1703-1721.
- De Koster, R.B., Stam, D. and Balk, B.M. (2011), "Accidents happen: the influence of safety-specific transformational leadership, safety consciousness, and hazard reducing systems on warehouse accidents", *Journal of Operations Management*, Vol. 29 Nos 7-8, pp. 753-765.
- Demartini, M.C. and Otley, D. (2019), "Beyond the system vs. package dualism in performance management systems design: a loose coupling approach", *Accounting, Organizations and Society*, 101072 (in press).
- Dillman, D.A. (2000), *Mail and Internet Surveys: The Tailored Design Method*, Wiley, New York, NY.
- Ditillo, A. and Lisi, I.E. (2014), "Towards a more comprehensive framework for sustainability control systems research", *Accounting for the Environment: More Talk and Little Progress (Advances in Environmental Accounting and Management)*, Emerald Group Publishing, Vol. 5, pp. 23-47.
- Ditillo, A. and Lisi, I.E. (2016), "Exploring sustainability control systems' integration: the relevance of sustainability orientation", *Journal of Management Accounting Research*, Vol. 28 No. 2, pp. 125-148.
- Durden, C. (2008), "Towards a socially responsible management control system", *Accounting, Auditing and Accountability Journal*, Vol. 21 No. 5, pp. 671-694.
- Evangelinos, K., Fotiadis, S., Skouloudis, A., Khan, N., Konstandakopoulou, F., Nikolaou, I. and Lundy, S. (2018), "Occupational health and safety disclosures in sustainability reports: an overview of trends among corporate leaders", *Corporate Social Responsibility and Environmental Management*, Vol. 25 No. 5, pp. 961-970.
- Falkenberg, L. and Herremans, I. (1995), "Ethical behaviours in organizations: directed by the formal or informal systems?", *Journal of Business Ethics*, Vol. 14 No. 2, pp. 133-143.
- Fan, W. and Yan, Z. (2010), "Factors affecting response rates of the web survey: a systematic review", *Computers in Human Behavior*, Vol. 26 No. 2, pp. 132-139.
- Faul, F., Erdfelder, E., Lang, A.G. and Buchner, A. (2007), "G* Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences", *Behavior Research Methods*, Vol. 39 No. 2, pp. 175-191.
- Fernández-Muñiz, B., Montes-Peón, J.M. and Vázquez-Ordás, C.J. (2007), "Safety culture: analysis of the causal relationships between its key dimensions", *Journal of Safety Research*, Vol. 38 No. 6, pp. 627-641.
- Fernández-Muñiz, B., Montes-Peón, J.M. and Vázquez-Ordás, C.J. (2009), "Relation between occupational safety management and firm performance", *Safety Science*, Vol. 47 No. 7, pp. 980-991.
- Fernández-Muñiz, B., Montes-Peón, J.M. and Vázquez-Ordás, C.J. (2014), "Safety leadership, risk management and safety performance in Spanish firms", *Safety Science*, Vol. 70, pp. 295-307.
- Ferreira, A. and Otley, D. (2009), "The design and use of performance management systems: an extended framework for analysis", *Management Accounting Research*, Vol. 20 No. 4, pp. 263-282.

- Flamholtz, E.G. Johanson, U. and Roslender, R. (2020), "Reflections on the progress in accounting for people and some observations on the prospects for a more successful future", *Accounting, Auditing and Accountability Journal*. doi: [10.1108/AAAJ-02-2019-3904](https://doi.org/10.1108/AAAJ-02-2019-3904) (in press).
- Freeman, R.E., Harrison, J.S., Wicks, A.C., Parmar, B.L. and De Colle, S. (2010), *Stakeholder Theory: The State of the Art*, Cambridge University Press, Cambridge.
- Frey, M., Battaglia, M. and Passetti, E. (2014), *Investing in Safety in the Environmental Hygiene Sector*, Franco Angeli, Milan.
- Friis, I., Hansen, A. and Vámosi, T. (2015), "On the effectiveness of incentive pay: exploring complementarities and substitution between management control system elements in a manufacturing firm", *European Accounting Review*, Vol. 24 No. 2, pp. 241-276.
- Gerdin, J. and Greve, J. (2008), "The appropriateness of statistical methods for testing contingency hypotheses in management accounting research", *Accounting, Organizations and Society*, Vol. 33 Nos 7-8, pp. 995-1009.
- Gerdin, J., Johansson, T. and Wennblom, G. (2019), "The contingent nature of complementarity between results and value-based controls for managing company-level profitability: a situational strength perspective", *Accounting, Organizations and Society*, Vol. 79, 101058.
- Goebel, S. and Weißenberger, B.E. (2017), "Effects of management control mechanisms: towards a more comprehensive analysis", *Journal of Business Economics*, Vol. 87 No. 2, pp. 185-219.
- Gomez-Conde, J., Lunkes, R.J. and Rosa, F.S. (2019), "Environmental innovation practices and operational performance. The joint effects of management accounting and control systems and environmental training", *Accounting, Auditing and Accountability Journal*, Vol. 32 No. 5, pp. 1325-1357.
- Grabner, I. and Moers, F. (2013), "Management control as a system or a package? Conceptual and empirical issues", *Accounting, Organizations and Society*, Vol. 38 Nos 6-7, pp. 407-419.
- Green, S.B. (1991), "How many subjects does it take to do a regression analysis", *Multivariate Behavioral Research*, Vol. 26 No. 3, pp. 499-510.
- Guldenmund, F.W. (2010), "(Mis)understanding safety culture and its relationship to safety management", *Risk Analysis: An International Journal*, Vol. 30 No. 10, pp. 1466-1480.
- Gunarathne, N., Samudrage, D., Wijesinghe, D.N. and Lee, K.H. (2016), "Fostering social sustainability management through safety controls and accounting", *Accounting Research Journal*, Vol. 29 No. 2, pp. 179-197.
- Hair, J.F. Jr, Hult, G.T.M., Ringle, C. and Sarstedt, M. (2017), *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, 2nd ed., Sage Publications, Thousand Oaks.
- Hair, J.F. Jr, Sarstedt, M., Ringle, C. and Gudergan, S.P. (2018), *Advanced Issues in Partial Least Squares Structural Equation Modeling*, Sage Publications, Thousand Oaks.
- Harrison, J.S., Bosse, D.A. and Phillips, R.A. (2009), "Managing for stakeholders, stakeholder utility functions, and competitive advantage", *Strategic Management Journal*, Vol. 31 No. 1, pp. 58-74.
- Hansen, E.G. and Schaltegger, S. (2016), "The sustainability balanced scorecard: a systematic review of architectures", *Journal of Business Ethics*, Vol. 133 No. 2, pp. 193-221.
- Henri, J.F. and Wouters, M. (2019), "Interdependence of management control practices for product innovation: the influence of environmental unpredictability", *Accounting, Organizations and Society*, 101073 (in press).
- Heras-Saizarbitoria, I., Boiral, O., Arana, G. and Allur, E. (2019), "OHSAS 18001 certification and work accidents: shedding Light on the connection", *Journal of Safety Research*, Vol. 68, pp. 33-40.
- Health and Safety Executive (HSE) (2003), *Out of Control: Why Control Systems Go Wrong and How to Prevent Failure*, HSE Books, London.
- Hörisch, J., Burritt, R.L., Christ, K.L. and Schaltegger, S. (2017), "Legal systems, internationalization and corporate sustainability. An empirical analysis of the influence of national and international authorities", *Corporate Governance*, Vol. 17 No. 5, pp. 861-875.

- Hornby, A.S. (2000), *Oxford Advanced Learners of Current English*, Oxford University Press, New York, NY.
- Istat (2014), "Salute e sicurezza sul lavoro", available at: https://www.istat.it/it/files//2014/12/stat-sicurezza_def.pdf (accessed 10 March 2016).
- Journeault, M. (2016), "The influence of the eco-control package on environmental and economic performance: a natural resource-based approach", *Journal of Management Accounting Research*, Vol. 28 No. 2, pp. 149-178.
- Kaplan, R.S. and Norton, D.P. (1996), "Linking the balanced scorecard to strategy", *California Management Review*, Vol. 39 No. 1, pp. 53-79.
- Koufteros, X., Verghese, A.J. and Lucianetti, L. (2014), "The effect of performance measurement systems on firm performance: a cross-sectional and a longitudinal study", *Journal of Operations Management*, Vol. 32 No. 6, pp. 313-336.
- Kreutzer, M., Cardinal, L.B., Walter, J. and Lechner, C. (2016), "Formal and informal control as complement or substitute? The role of the task environment", *Strategy Science*, Vol. 1 No. 4, pp. 235-255.
- Laguir, L., Laguir, I. and Tchameni, E. (2019), "Implementing CSR activities through management control systems: a formal and informal control perspective", *Accounting, Auditing & Accountability Journal*, Vol. 32 No. 2, pp. 531-555.
- Lisi, I.E. (2015), "Translating environmental motivations into performance: the role of environmental performance measurement systems", *Management Accounting Research*, Vol. 29 December, pp. 27-44.
- Lisi, I.E. (2018), "Determinants and performance effects of social performance measurement systems", *Journal of Business Ethics*, Vol. 152 No. 1, pp. 225-251.
- Loeppke, R.R., Hohn, T., Baase, C., Bunn, W.B., Burton, W.N., Eisenberg, B.S., Ennis, T., Fabius, R., Hawkins, R.J., Hudson, T.W., Hymel, P.A., Konicki, D., Larson, P., McLellan, R.K., Roberts, M.A., Usrey, C., Wallace, J.A., Yarborough, C.M. and Siuba, J. (2015), "Integrating health and safety in the workplace: how closely aligning health and safety strategies can yield measurable benefits", *Journal of Occupational and Environmental Medicine*, Vol. 57 No. 5, pp. 585-597.
- Malmi, T. and Brown, D.A. (2008), "Management control systems as a package—opportunities, challenges and research directions", *Management Accounting Research*, Vol. 19 No. 4, pp. 287-300.
- Masschelein, S. and Moers, F. (2020), "Testing for complementarities between accounting practices", *Accounting, Organizations and Society*, 101127 (in press).
- Matějka, M., Merchant, K.A. and O'Grady, W. (2020), "An empirical investigation of beyond budgeting practices", *Journal of Management Accounting Research*. doi: [10.2308/jmar-19-010](https://doi.org/10.2308/jmar-19-010) (in press).
- Merchant, K.A. (1998), *Modern Management Control Systems: Text and Cases*, Prentice Hall, London.
- Merchant, K.A. and Van der Stede, W.A. (2007), *Management Control Systems: Performance Measurement, Evaluation and Incentives*, Pearson Education, London.
- Müller-Stewens, B., Widener, S.K., Möller, K. and Steinmann, J.C. (2020), "The role of diagnostic and interactive control uses in innovation", *Accounting, Organizations and Society*, Vol. 80, 101078.
- Mundy, J. (2010), "Creating dynamic tensions through a balanced use of management control systems", *Accounting, Organizations and Society*, Vol. 35 No. 5, pp. 499-523.
- Narayanan, V. and Boyce, G. (2019), "Exploring the transformative potential of management control systems in organisational change towards sustainability", *Accounting, Auditing and Accountability Journal*, Vol. 32 No. 5, pp. 1210-1239.
- Neal, A. and Griffin, M.A. (2006), "A study of the lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels", *Journal of Applied Psychology*, Vol. 91 No. 4, pp. 946-953.
- Norris, G. and O'Dwyer, B. (2004), "Motivating socially responsive decision making: the operation of management controls in a socially responsive organisation", *The British Accounting Review*, Vol. 36 No. 2, pp. 173-196.

- O'Neill, S., McDonald, G. and Deegan, C.M. (2015a), "Lost in translation: institutionalised logic and the problematisation of accounting for injury", *Accounting, Auditing and Accountability Journal*, Vol. 28 No. 2, pp. 180-209.
- Otley, D. (2016), "The contingency theory of management accounting and control: 1980-2014", *Management Accounting Research*, Vol. 31, pp. 45-62.
- Ouchi, W.G. (1977), "The relationship between organizational structure and organizational control", *Administrative Science Quarterly*, Vol. 22 No. 1, pp. 95-113.
- Ouchi, W.G. (1979), "A conceptual framework for the design of organizational control mechanisms", *Management Science*, Vol. 25 No. 9, pp. 833-848.
- O'Neill, S. and Wolfe, K. (2017), *Measuring and Reporting on Work Health and Safety*, Safe Work Australia, Canberra.
- O'Neill, S., Martinov-Bennie, N., Cheung, A. and Wolfe, K. (2013), *Issues in the Measurement and Reporting of Work Health and Safety Performance: A Review*, Safe Work Australia, Canberra.
- O'Neill, S., Wolfe, M.K., Holley, S. and Press, M.L. (2015b), *Performance Measurement, Incentives and Organisational Culture*, Safe Work Australia, Canberra.
- O'Neill, S., Flanagan, J. and Clarke, K. (2016), "Safewash! Risk attenuation and the (Mis) reporting of corporate safety performance to investors", *Safety Science*, Vol. 83, pp. 114-130.
- Pagell, M., Johnston, D., Veltri, A., Klassen, R.D. and Biehl, M. (2014), "Is safe production an oxymoron?", *Production and Operations Management*, Vol. 23 No. 7, pp. 1161-1175.
- Pagell, M., Klassen, R.D., Johnston, A., Shevchenko, A. and Sharma, S. (2015), "Are safety and operational effectiveness contradictory requirements: the roles of routines and relational coordination", *Journal of Operations Management*, Vol. 36, pp. 1-14.
- Parker, L. and Chung, L. (2018), "Structuring social and environmental management control and accountability: behind the hotel doors", *Accounting, Auditing and Accountability Journal*, Vol. 31 No. 3, pp. 993-1023.
- Passetti, E. and Battaglia, M. (2020), "A sociotechnical analysis of accounting for employee health and safety: evidence from a multiple case study", in Del Baldo, M., Dillard, J., Baldarelli, M.G. and Ciambotti, M. (Eds), *Accounting, Accountability and Society*, Springer, Cham, pp. 43-59.
- Passetti, E., Cinquini, L., Marelli, A. and Tenucci, A. (2014), "Sustainability accounting in action: lights and shadows in the Italian context", *The British Accounting Review*, Vol. 46 No. 3, pp. 295-308.
- Passetti, E., Cinquini, L. and Tenucci, A. (2018), "Implementing internal environmental management and voluntary environmental disclosure", *Accounting, Auditing and Accountability Journal*, Vol. 31 No. 4, pp. 1145-1173.
- Pfister, J.A. and Lukka, K. (2019), "Interrelation of controls for autonomous motivation: a field study of productivity gains through pressure-induced process innovation", *The Accounting Review*, Vol. 94 No. 3, pp. 345-371.
- Pondeville, S., Swaen, V. and De Rongé, Y. (2013), "Environmental management control systems: the role of contextual and strategic factors", *Management Accounting Research*, Vol. 24 No. 4, pp. 317-332.
- Qian, W., Burritt, R. and Monroe, G. (2011), "Environmental management accounting in local government", *Accounting, Auditing and Accountability Journal*, Vol. 18 No. 3, pp. 346-373.
- Rae, A.J. and Alexander, R.D. (2017), "Probative blindness and false assurance about safety", *Safety Science*, Vol. 92, pp. 190-204.
- Rasmussen, J. (1997), "Risk management in a dynamic society: a modelling problem", *Safety Science*, Vol. 27 Nos 2-3, pp. 183-213.
- Reason, J., Parker, D. and Lawton, R. (1998), "Organizational controls and safety: the varieties of rule-related behaviour", *Journal of Occupational and Organizational Psychology*, Vol. 71 No. 4, pp. 289-304.

- Reynolds, S.J., Schultz, F.C. and Hekman, D.R. (2006), "Stakeholder theory and managerial decision-making: Constraints and implications of balancing stakeholder interests", *Journal of Business Ethics*, Vol. 64 No. 3, pp. 285-301.
- Rodrigue, M., Magnan, M. and Boulianne, E. (2013), "Stakeholders' influence on environmental strategy and performance indicators: a managerial perspective", *Management Accounting Research*, Vol. 24 No. 4, pp. 301-316.
- Sadiq, N. (2012), *OHSAS 18001 Step by Step: A Practical Guide*, IT Governance Publishing, Ely.
- Sandelin, M. (2008), "Operation of management control practices as a package—a case study on control system variety in a growth firm context", *Management Accounting Research*, Vol. 19 No. 4, pp. 324-343.
- Schaltegger, S. and Burritt, R.L. (2010), "Sustainability accounting for companies: catchphrase or decision support for business leaders?", *Journal of World Business*, Vol. 45 No. 4, pp. 375-384.
- Schneider, B., Breif, A.P. and Guzzo, R.A. (1996), "Creating a climate and culture for sustainable organizational change", *Organizational Dynamics*, Vol. 24 No. 4, pp. 7-19.
- Sihag, V. and Rijdsdijk, S.A. (2019), "Organizational controls and performance outcomes: a Meta-analytic assessment and extension", *Journal of Management Studies*, Vol. 56 No. 1, pp. 91-133.
- Simons, R. (1994), *Levers of Control: How Managers Use Innovative Control Systems to Drive Strategic Renewal*, Harvard Business Press, Boston.
- Speklé, R.F. and Widener, S.K. (2018), "Challenging issues in survey research: discussion and suggestions", *Journal of Management Accounting Research*, Vol. 30 No. 2, pp. 3-21.
- Sundin, H., Granlund, M. and Brown, D.A. (2010), "Balancing multiple competing objectives with a balanced scorecard", *European Accounting Review*, Vol. 19 No. 2, pp. 203-246.
- Tappura, S., Sievänen, M., Heikkilä, J., Jussila, A. and Nenonen, N. (2015), "A management accounting perspective on safety", *Safety Science*, Vol. 71 No. Part B January, pp. 151-159.
- Tessier, S. and Otley, D. (2012), "A conceptual development of Simons' Levers of Control framework", *Management Accounting Research*, Vol. 23 No. 3, pp. 171-185.
- Testa, F., Gusmerottia, N.M., Corsini, F., Passetti, E. and Iraldo, F. (2016), "Factors affecting environmental management by small and micro firms: the importance of entrepreneurs' attitudes and environmental investment", *Corporate Social Responsibility and Environmental Management*, Vol. 23 No. 6, pp. 373-385.
- Testa, F., Gusmerotti, N.M., Corsini, F. and Iraldo, F. (2020), "Predictors of organizational citizenship behavior in relation to environmental and health and safety issues", *International Journal of Human Resource Management*, Vol. 31 No. 13, pp. 1705-1738.
- Tucker, B.P. (2019), "Heard it through the grapevine: conceptualizing informal control through the lens of social network theory", *Journal of Management Accounting Research*, Vol. 31 No. 1, pp. 219-245.
- Turner, K.L. and Makhija, M.V. (2006), "The role of organizational controls in managing knowledge", *Academy of Management Review*, Vol. 31 No. 1, pp. 197-217.
- Van der Kolk, B., van Veen-Dirks, P.M. and ter Bogt, H.J. (2019), "The impact of management control on employee motivation and performance in the public sector", *European Accounting Review*, Vol. 28 No. 5, pp. 901-928.
- Van der Stede, W.A., Young, S.M. and Chen, C.X. (2006), "Doing management accounting survey research", in Chapman, C.S., Hopwood, A.G. and Shields, M.D. (Eds), *Handbooks of Management Accounting Research*, Vol. 1, pp. 445-478.
- Widener, S.K. (2007), "An empirical analysis of the levers of control framework", *Accounting, Organizations and Society*, Vol. 32 Nos 7-8, pp. 757-788.
- Wijethilake, C., Munir, R. and Appuhami, R. (2017), "Strategic responses to institutional pressures for sustainability", *Accounting, Auditing and Accountability Journal*, Vol. 30 No. 8, pp. 1677-1710.

Zhao, D., McCoy, A.P., Kleiner, B.M., Mills, T.H. and Lingard, H. (2016), "Stakeholder perceptions of risk in construction", *Safety Science*, Vol. 82, pp. 111-119.

Zohar, D. (2010), "Thirty years of safety climate research: reflections and future directions", *Accident Analysis and Prevention*, Vol. 42 No. 5, pp. 1517-1522.

Further reading

Casey, T.W., Neal, A. and Griffin, M. (2019), "LEAD operational safety: development and validation of a tool to measure safety control strategies", *Safety Science*, Vol. 118, pp. 1-14.

Curcuruto, M., Conchie, S.M., Mariani, M.G. and Violante, F.S. (2015), "The role of prosocial and proactive safety behaviors in predicting safety performance", *Safety Science*, Vol. 80, pp. 317-323.

Richardson, H.A., Simmering, M.J. and Sturman, M.C. (2009), "A tale of three perspectives: examining post hoc statistical techniques for detection and correction of common method variance", *Organizational Research Methods*, Vol. 12 No. 4, pp. 762-800.

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Appendix

Variable	Items	References	Taken by the construct
H&S action controls	Formal channels communication	Adapted from Pondeville et al. (2013)	Formal EMCS
	Plans and manuals	Adapted from Pondeville et al. (2013)	Formal EMCS
	Managerial responsibilities	Adapted from Pondeville et al. (2013)	Formal EMCS
H&S informal controls	Workers suggestions	Adapted from Pondeville et al. (2013)	Informal EMCS
	Staff units' suggestion	Adapted from Pondeville et al. (2013)	Informal EMCS
	Informal discussion	Adapted from Pondeville et al. (2013)	Informal EMCS
	Managers autonomy	Adapted from Pondeville et al. (2013)	Informal EMCS
H&S performance	Employee injuries	Fernández-Muñiz et al. (2009)	H&S performance
	Risks assessment	Developed by Battaglia et al. (2015)	
	Normative violations	Developed by Battaglia et al. (2015)	
	Material damage	Fernández-Muñiz et al. (2009)	H&S performance
Business practices	Employees absenteeism and lost time reduction	Fernández-Muñiz et al. (2009)	H&S performance
	Working practices innovation	Adapted from Koufteros et al. (2014)	Operational capability
	Integrated solutions	Adapted from Koufteros et al. (2014)	Operational capability
	Operational improvements	Adapted from Koufteros et al. (2014)	Operational capability
	Employees safety at an operational level	Adapted from Koufteros et al. (2014)	Operational capability
External stakeholder relations	Suppliers	Adapted from Koufteros et al. (2014)	External stakeholder relations capability
	Local community	Adapted from Journeault (2016)	Stakeholder integration
	Labour unions	Developed by Battaglia et al. (2015)	
H&S results controls	National institutions	Developed by Battaglia et al. (2015)	
	Supervisory organisms	Developed by Battaglia et al. (2015)	
	Incentive system related to targets	Developed by Arjaliès and Mundy (2013)	
	Performance evaluation and monitoring	Adapted from Pondeville et al. (2013)	Formal EMCS
	Objectives within the planning system	Adapted from Pondeville et al. (2013)	Formal EMCS
	Critical performances and budget process	New item	

Table A1. Measurement of the theoretical constructs

The constructs are reflective and measured using multiple items with a seven-point Likert scale ranging from 1 (representing a negative assessment of the trait, e.g. low) to 7 (representing a positive assessment of the trait, e.g. very high) for almost all the questions. The weight of all the points of the Likert scale was explained in the questionnaire. Investments variable was based on a scale of 0–2.

To what extent the following mechanisms related to H&S issues are used/present in your company to support and motivate employees behaviour

- (1) Formal communication channels are used to communicate objectives and targets related to H&S
- (2) Plans and manuals define H&S procedures and actions within the different areas and units of the organisation
- (3) There are widespread managerial H&S responsibilities at different levels within the organisation

To what extent the following mechanisms related to H&S issues are used/present in your company in order to monitor and assess H&S results

- (1) H&S results are linked with the company incentive system
- (2) H&S performance progress is measured and assessed at different levels within the organisation
- (3) H&S objectives are defined in the planning system of the organisation
- (4) Critical performances and budget process include H&S aspects

To what extent the following informal mechanisms concerning participation and collaboration are present in your company

- (1) Workers are encouraged to make a suggestion for the improvement of H&S management
- (2) Staff units are encouraged to make a suggestion for the improvement of H&S management
- (3) H&S issues are regularly informally discussed among colleagues
- (4) Managers have enough autonomy to manage H&S issues

To what extent H&S issues are integrated within your organisation in order to support the development of the following internal activities

- (1) H&S allows achieving working practice innovation
- (2) H&S allows developing integrated solutions
- (3) H&S promotes operational improvements
- (4) H&S allows increasing employees safety at operational level

To what extent H&S issues are important in the management of the following external stakeholder relations

- (1) H&S allows improving supplier relations
- (2) H&S allows improving local community relations
- (3) H&S allows improving labour union relations
- (4) H&S allows improving H&S related national institutions relations
- (5) H&S allows improving H&S supervisory organism relations

To what extent the following H&S performance has been improved in your company over the past three years

- (1) Employee injuries reduction
- (2) H&S risk assessment reduction related to your business
- (3) H&S normative violations reduction
- (4) Reduction of damage to work equipment such as vehicles and plants
- (5) Employees absenteeism and lost time reduction

To what extent your company has invested financial resources, time and employees in the following H&S activities over the past 3 years

- (1) increase the number of employees within the H&S office/unit
- (2) H&S office/unit education and training activities
- (3) Operational employees training
- (4) New technology related to H&S management
- (5) Personal protective equipment
- (6) Development of new operational procedures
- (7) Development of an information system for H&S
- (8) Development of specific and ad-hoc H&S campaigns within organisation
- (9) Development of new internal communication tools related to H&S
- (10) Development of external communication tools related to H&S
- (11) Strengthening of internal audit