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Smart disclosure: an enabler for multinationals to reduce human rights violations in global supply chains

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Abstract
Existing research has underscored that the lack of supplier visibility poses a primary obstacle for multinational corporations (MNCs) to tackle human rights violations within their global supply chains (GSC). To address this challenge, MNCs are increasingly adopting the concept of "smart disclosure" to enhance supplier visibility. However, its conceptualization, operationalization, and efficacy in reducing human rights violations, remain unclear. Filling this gap, we first draw on research about attributes of digital technologies and information disclosure to define and operationalize smart disclosure in the context of GSC. We then draw on insights from institutional theory to theorize that smart disclosure – as a visibility-enhancing mechanism – enables MNCs to fulfill the role of "institutional carriers" and effectively impose institutional pressures on suppliers, fostering an environment where suppliers' adherence to human rights standards is desired, supported, and rewarded. We further propose that this effect is stronger for suppliers with higher centrality in GSC networks and those in countries with greater civil society development. We found support for our arguments by analyzing 8527 observations at the MNC-supplier-year level in the global apparel industry from 2014 to 2020.

Keywords Global supply chain · Human rights · Smart disclosure · Institutional theory · Compliance · Visibility · Multinational corporations · Sustainability · Civil society · Centrality

Introduction

Human rights violations are a longstanding grand challenge worldwide (Buckley et al., 2017; Wettstein et al., 2019). Notably, a significant portion of these violations occur within multinational companies' (MNCs) global supply chains (GSCs) (ILO, 2019). Increasing attention from global stakeholders has imposed mounting pressure on MNCs to address human rights violations across GSCs (Narula, 2019). This expectation is largely rooted in the anticipated role of MNCs as "institutional carriers" (i.e., entities responsible for transmitting institutional norms and practices) (Kostova & Roth, 2002; Scott, 2003), given their extensive resources and international reach. However, a recognized obstacle for MNCs in their passive or proactive role as institutional carriers is the lack of visibility of their GSCs – namely, when suppliers are not readily visible and are hidden in supply chains (Kim & Davis, 2016). In response, MNCs are increasingly adopting digital technologies to facilitate information gathering and sharing, aiming to improve GSC visibility in a "smart" fashion (George & Schillebeeckx, 2022; Meyer, Li, Brouthers, & Jean, 2023). Anecdotal evidence resonates with this trend. For instance, among the top 250 global fashion brands, the proportion of those sharing GSC data in a machine-readable format, which allows easy interpretation and sharing via software applications, tripled from 10% in 2020 to 31% in 2022 (Fashion Revolution, 2022).

However, the conceptualization and efficacy of this approach in enhancing GSC visibility and thereby tackling human rights issues remain understudied. To fill this gap, we focus on defining MNCs' "smart disclosure" of GSC information and propose a theoretical framework grounded in institutional theory to explain how smart disclosure enhances MNCs' role as institutional carriers through heightened supplier visibility. First, we synthesize previous research on the attributes of digital technologies and information disclosure

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(Sayogo et al., 2014; Thaler & Tucker, 2013) to lay the groundwork for comprehending the essential components constituting smart disclosure. We define smart disclosure as a collection of information-disclosure activities facilitated by digital technologies to foster heightened intelligence and interconnectedness among all relevant information sources and users. We argue that smart disclosure functions as a visibility-enhancing mechanism by leveraging data *intelligence*, which involves making data easily accessible and programmable for all relevant users, and *interconnectivity*, which entails creating interactive and standardized connections between data providers and users.

Second, building on institutional theory and literature on MNCs as institutional carriers (Guler, Guillen, & Macpherson, 2002; Kostova & Roth, 2002; Meyer & Rowan, 1977; Scott, 2003), we argue that MNCs' role as institutional carriers is constrained by the lack of visibility of potential adopters – represented by suppliers in our context. Although institutional theory research has long underscored how visibility impacts firm compliance directly (Chang & Milkman, 2019; Julian et al., 2008), there has not been much focus on how it influences compliance indirectly through institutional carriers. We argue that the transmission of desired norms is hindered when potential adopters are not readily accessible through institutional carriers. Thus, by enhancing GSC visibility, smart disclosure can generate compliance pressure, incentives, and assistance for suppliers when needed, ultimately reducing their human rights violations. Furthermore, we present boundary conditions that may impact the effectiveness of smart disclosure. Internally, suppliers may exhibit varying receptiveness to transmitted values based on their centrality within the network and dependencies on institutional carriers (Guler et al., 2002; Kostova, 1999). Externally, differences in local institutional conditions, such as civil society development, may affect the adoption of transmitted norms due to conflicting pressures from suppliers' home countries (Kostova & Roth, 2002). We found support for our arguments by analyzing a unique dataset of 8527 observations at the MNC-supplier-year level in the global apparel industry from 2014 to 2020.

Our study offers three major theoretical implications. First, we contribute to institutional theory by extending the understanding of MNCs as institutional carriers. While prior studies have primarily focused on visible potential adopters, such as subsidiaries (Guler et al., 2002; Kostova & Roth, 2002), our study complements this research by focusing on potential adopters that operate in relative obscurity, thus underscoring the critical role of their visibility. Specifically, we conceptualize and operationalize smart disclosure as a visibility-enhancing mechanism and investigate its efficacy and boundary conditions. Second, we enrich the field of sustainable supply chain management by studying how digital technology-mediated approach may help address human rights issues in GSCs. Last, we contribute to the information-disclosure literature by moving beyond assessments of the quantity and quality of information disclosure (e.g., Christensen, 2016) to the exploration of how such information is generated and delivered.

Cross-disciplinary insights on human rights violations in GSCs

To MNCs, the International Labour Organization (ILO) has succinctly conveyed an alarming reality that "one thing is clear – child labour, forced labour, and human trafficking are a whole-of-supply-chain problem" (ILO, 2019: 16). This goes hand in hand with a revision of the Organisation for Economic Co-operation and Development's "Guidelines for Multinational Enterprises" in 2011 prominently elevated safeguarding human rights as one of the key pillars of responsible business conduct for MNCs. Recognizing this growing expectation placed on MNEs, an increasing number of scholars from different disciplines have delved into factors that either enable or hinder MNCs from upholding human rights within their GSCs.

Within the international business (IB) domain, scholars have acknowledged that there is an urgent need to delve further into human rights violations within the global business context. IB scholars have underscored the significant presence of human rights abuses in MNCs' GSCs (e.g., Clarke & Boersma, 2017). However, as Wettstein et al. (2019) pointed out, "despite this longstanding focus on topics relating to responsible business, human rights have not played a prominent role in the IB literature to date" (p. 56). Although existing studies have provided rich insights regarding solutions to environmental violations within GSCs, scholars have pointed out that social challenges, including human rights violations, are fundamentally distinct from environmental issues due to their distinct ethical underpinnings and societal impacts (see Ashby, Leat, & Hudson-Smith, 2012 for a review).

Within the sustainable supply chain management literature, scholars outlines the conventional "cascading approach," whereby MNCs pressure immediate suppliers to comply with sustainability requirements, and those suppliers then convey them to lower-tier suppliers. However, studies have shown that MNCs often fail to extend sustainability to lower-tier suppliers because they are not on the "immediate radar" (Villena, 2019: 1151). Although prior research has proposed solutions for MNCs to influence their suppliers, such as cross-functional sustainable procurement programs (Villena, 2019) and direct supplier supervision and monitoring (Duan, Hofer, & Aloysius, 2021), these mechanisms remain effective when MNCs know who their suppliers are.

Finally, the information-disclosure literature underscores the pivotal role of information as a regulatory tool to enhance firm visibility in addressing sustainability challenges (Bansal, 2005; Chiu & Sharfman, 2011). This literature has recently documented how MNCs' disclosure has increasingly become "smarter" (e.g., Thaler & Tucker, 2013). This trend resonates with the viewpoint of the Changing Markets Foundation (2022), a global nonprofit organization advocating sustainability, which contended that "transparency is not just about bombarding the public with information, but is about presenting this information in such a way that information can be easily found and understood, and if necessary, challenged" (p. 11). Still, existing literature has primarily concentrated on the content aspect of information (e.g., Christensen, 2016), lacking insights into how such information is generated and conveyed.

An institutional perspective of MNCs' role in addressing human rights violations in GSCs

In this paper, we adopt an institutional perspective to theorize how MNCs, as institutional carriers, face constraints in addressing human rights violations in GSCs. Institutional carriers are entities that help "institutional elements move from place to place and time to time" (Scott, 2003: 879); "diffuse and reinforce existing norms, values, and models" (Kraatz & Moore, 2002: 128); and "help build shared cognitive understanding around a regulatory change" (Armanios & Eesley, 2021: 1419). MNCs are typically perceived to be institutional carriers as their extensive resources and global reach enable them to transmit institutional norms across their networks (Guler et al., 2002; Kostova & Roth, 2002). Scholars have highlighted how MNCs are positioned to introduce and advocate for sustainability norms in a broader institutional context (Husted & Allen, 2006). This behavior may be driven by their self-interested motivation to address sustainability issues for their reputation management that stem from growing stakeholder pressures (Asmussen, Fosfuri, Larsen, & Santangelo, 2023). An implicit basis for institutional carriers' effective functioning is visible interaction and engagement between these carriers and the organizations they intend to impact – namely, potential adopters (Scott, 2003). Consequently, MNCs are constrained in fulfilling their role as institutional carriers when suppliers are not readily visible. This lack of supplier visibility refers to situations where the suppliers within their GSC are not easily discernible, often due to complex supply chain relationships (Kim & Davis, 2016).

The lack of supplier visibility poses challenges not only in diffusing practices from institutional carriers but also in incentivizing and assisting compliance. First, invisible suppliers may remain unaware of the specific norms endorsed by institutional carriers – MNCs. Without access to and understanding these values, suppliers are less likely to align their behavior with the desired standards (Chang & Milkman, 2019; Julian, Ofori-Dankwa, & Justis, 2008). When suppliers remain hidden, it also becomes more challenging for institutional carriers to track and evaluate compliance accurately, thus weakening their ability to enforce adherence to desired norms. Compliance tends to be more prevalent among firms visible to a larger pool of stakeholders who foster a coalition of scrutiny (Chang & Milkman, 2019). Thus, in the absence of visibility, firms tend to exhibit "defiance" toward institutional pressures, particularly when they lack a proper understanding of the rationale behind these pressures and the potential consequences of noncompliance (Oliver, 1991: 156).

Second, visibility may facilitate collaboration between institutional carriers and potential adopters (i.e., MNCs and suppliers in our context), particularly when compliance entails significant resources (Wijen, 2014). Increased visibility enables suppliers to seek assistance by tapping into external resources and collaborative efforts. This assistance is particularly pivotal since suppliers often confront resource limitations when addressing human rights concerns (Wilhelm, Blome, Bhakoo, & Paulraj, 2016). Conversely, MNCs may be less aware of the struggles faced by invisible suppliers. Despite external stakeholders' willingness to assist (Chatain & Plaksenkova, 2019), the challenge lies in effectively identifying and reaching out to such suppliers. Moreover, highly visible suppliers are more likely to convert the reputational benefits from compliance to economic benefits (e.g., more future transactions and robust client relationships) (Pedersen & Andersen, 2007). Hence, they tend to be more receptive to institutional carriers' influence in reducing human rights violations.

Accordingly, an important question arises: *how do MNCs enhance the visibility of GSCs*? Below, we expand upon recent discussions regarding the growing trend of MNCs' utilization of digital technologies to disclose GSC information (Kalkanci & Plambeck, 2020; Wang, 2023). Specifically, we conceptualize and operationalize the construct of smart disclosure and develop a theoretical framework explaining how it augments supplier visibility.

Conceptualization of smart disclosure in the context of GSCs

The term *smart disclosure* underscores the drive to leverage digital technologies to facilitate information disclosure, distinguishing it from conventional disclosure (Office of Information and Regulatory Affairs, 2011; Sayogo et al., 2014; Thaler & Tucker, 2013). Scholars and practitioners

have employed various terms to describe the attributes of these smart/digital technology artifacts. As Nasiri, Ukko, Saunila, and Rantala (2020) explicitly stated, "smart technologies are defined by certain key characteristics … that make interconnectivity and intelligence of companies possible" (p. 2). To define the core properties of smart disclosure, we conducted a comprehensive literature review, surveyed a panel of experts, and performed empirical testing to ensure content validity (see Online Appendices A–C).

Synthesizing the extant literature on the properties of digital technology artifacts, we define s*mart disclosure* as *a collection of information-disclosure activities facilitated by digital technologies aimed at fostering a heightened degree of intelligence and interconnectedness for all relevant information sources and users.* Specifically, the intelligence attribute of smart disclosure is attained through the accessibility and programmability of the disclosed data, and the interconnectivity characteristic is demonstrated by data interactivity and standardizability. We employ the GSC context to concretely define and illustrate each attribute of smart disclosure.

The first two properties – data accessibility and programmability – represent intelligence, indicating where data is located and how data is used (IDC, 2019). First, *data accessibility* captures how smart disclosure aims to provide data in a manner that enables users to locate it effortlessly (Kallinikos et al., 2013; Thaler & Tucker, 2013). This feature allows information to be accessed by as many relevant audiences as possible in the easiest way possible. High accessibility is reflected by user-friendly interfaces to readily locate desired information. As an example of smart disclosure with high accessibility, Under Armour's supplier list datafile can be accessed with a mere two clicks from its website home page: [Home page → Sustainability → July 2018 Supplier List Disclosure]. The lack of accessibility occurs when "crucial pieces of data are hidden in annexes and footnotes of long technical reports or buried dozens of clicks away from the homepage of brands' websites" (Fashion Revolution, 2021: 13). For instance, Adidas demonstrates a lower level of accessibility on its website as it requires a sequence of five steps [Home page → Sustainability → Compliance → Supply chain approach → Supply chain structure → 2018 Global supplier list] to obtain its supplier data.

Second, *data programmability* refers to how smart disclosure offers raw data that can be employed for computational operations (e.g., data tailoring and analysis), enhancing the flexibility and effectiveness of information sharing (Kallinikos et al., 2013). This property has been described in different terms, including machine readability (Thaler & Tucker, 2013) and editability (Kallinikos, Aaltonen, & Marton, 2013). Fundamentally, the attribute of programmability enriches data intelligence by rendering information adaptable to interpretations and adjustments by various users. As an example of smart disclosure with high programmability, Nike provides raw data on its GSCs with a broad range of detailed information in excel format that users can employ to run independent analyses with ease (e.g., sorting data and analyzing the content). In contrast, some brands disclose aggregated data that precludes further analysis.

The next two properties – interactivity and standardizability – relate to interconnectivity, or the seamless exchange of information among disclosers, users, and relevant intermediaries. First, *data interactivity* captures efficient communication with other digital artifacts, infrastructures, and users through integrated digital communication channels (Albert, Goes, & Gupta, 2004; Kallinikos et al., 2013). This property essentially allows multidirectional communication between information disclosers and users. This interaction empowers users to engage with the information, nurturing active information exchange. Notably, social media serves as a powerful tool to attain heightened data interactivity as the conversational nature of social platforms links nearly half of the global population (DataReportal, 2020). Hence, data interactivity is intricately intertwined with the utilization of various social media channels (Leonardi & Vaast, 2017). As an example of smart disclosure with high interactivity, Adidas offers social media sharing banners alongside its GSC data so users can readily post and share information directly to three social media platforms (i.e., Facebook, Twitter, and LinkedIn).

Finally*, data standardizability* captures the extent to which related information is available in standardized vocabularies and formats, thus allowing users to understand and process information efficiently. This property addresses the challenge of "interoperability" in information exchange by enabling different systems to connect and collaborate (Kallinikos et al., 2013). It helps efficiently connect various stakeholders by providing a basis for using common data tools to compare and analyze across datasets (Dingwerth & Eichinger, 2010; National Science and Technology Council, 2013). As an illustration of how firms can achieve high data standardizability in their disclosures, Nike follows the Fair Labor Association's (FLA) guidance. This guidance provides a clear set of requirements that partner firms must follow when they disclose GSC information. Thus, establishing affiliations with renowned specialized initiatives can mitigate the uncertainty caused by inconsistent reporting systems and vague standards.

The enabling effect of smart disclosure in reducing suppliers' human rights violations

We propose that MNCs' smart disclosure of GSC information serves as an enabler in reducing suppliers' engagement in human rights violations. In essence, smart disclosure – as a visibility-enhancing mechanism – enables MNCs to fulfill the role of institutional carriers and effectively impose institutional pressures on suppliers, fostering an environment where suppliers' adherence to human rights standards is desired, supported, and rewarded.

First, the high intelligence (i.e., high data accessibility and programmability) of smart disclosure helps MNCs identify and reach a wide range of suppliers to exert compliance pressure on upholding human rights. Unlike conventional approaches that often result in one-sided data collection and distribution, smart disclosure facilitates multidirectional information gathering, interpretation, and sharing between data providers and users. This property is critically important in improving the visibility of suppliers concealed within GSCs, which often span multiple tiers and countries, and speeding up how MNCs and stakeholders can connect suppliers and their activities. With unmediated channels to access and exchange information, more external stakeholders can intervene in identifying and addressing human rights issues in GSCs. As the spotlight on these suppliers intensifies, the scrutiny they face amplifies, thus raising compliance pressure (Chang & Milkman, 2019; Chiu & Sharfman, 2011). For instance, Arisa, a nongovernment organization (NGO) advocating for human rights, used MNCs' smart disclosure of supplier lists and successfully contacted 725 Tamil Nadu's textile industry workers to identify human rights violators, achieving a quick rectification of human rights issues (Fashion Revolution, 2021).

Second, the substantial interconnectivity (i.e., high interactivity and standardizability) of smart disclosure provides a participatory platform to effectively engage all relevant stakeholders in a meaningful dialogue to increase GSC visibility. Prior research has argued that the extent to which a firm's activities are visible is directly linked to the intensity of attention those activities attract (Chang & Milkman, 2019; Julian et al., 2008). Thus, due to this heightened visibility on the GSC, suppliers experience a substantial increase in awareness and exposure from their stakeholders, transforming the narrative from mere compliance to active engagement in the exchange of information. Accordingly, MNCs fulfill their role as institutional carriers by imposing institutional pressures and nurturing an environment where suppliers are encouraged to connect with institutional carriers and align their practices with human rights standards. For instance, when Fashion Revolution initiated the "#WhoMadeMyClothes" campaign, MNCs that released smart disclosure of GSC information could engage with more stakeholders [e.g., H&M retweeted the hashtag on Twitter to interact with users in their local languages in all the countries where it operates, and Gildan posted a picture of factory workers with the response "#IMadeYourClothes" on its website (Gildan, 2022)]. By leveraging such social buzz, MNCs can motivate more stakeholders to participate in this movement and follow up on solutions. Furthermore, the interconnectivity aspect of smart disclosure can foster collaboration among stakeholders, enabling them to collectively screen for human rights abuses within GSCs (Chiu & Sharfman, 2011). For example, when the Worker Rights Consortium detected factories with human rights violations, firms like VF Corporation and Levi Strauss & Co benefited from their smart disclosure of GSC information and were able to reach their suppliers and enforce remedies to resolve the issues relatively quickly (Fashion Revolution, 2021).

Therefore, the integrated feature of intelligence and interconnectivity within smart disclosure creates a powerful framework that amplifies compliance pressure and enables a network approach for collaboration, rectifying human rights violations within GSCs. Hence, we propose:

Hypothesis 1 All else being equal, there is a negative association between the degree of an MNC's smart disclosure of GSC information and a focal supplier's human rights violations.

Boundary conditions

The effectiveness of institutional carriers in conveying institutional expectations and shaping firm behaviors depends significantly on the internal and external contexts of potential adopters – i.e., suppliers in our context (Guler et al., 2002; Kostova, 1999; Kostova & Roth, 2002). Internally, potential adopters exhibit varying degrees of receptiveness to transmitted norms and values based on their network connections and dependencies on institutional carriers (Guler et al., 2002; Kostova, 1999). Externally, differences in local institutional conditions may also affect potential adopters' reception and adoption of transmitted norms because they may face varying influences and pressures from their specific local contexts (Kostova & Roth, 2002). In our paper, for the internal context, we focus on the intricate dynamics within GSCs, whereas for the external context, we focus on suppliers' home-country conditions.

Supplier centrality

Supplier centrality captures the degree to which a supplier directly connects with other players in its GSC network, including upstream ties with other suppliers and downstream

ties with clients (Potter & Wilhelm, 2020). We argue that high-centrality suppliers as potential adopters are more likely to be receptive to MNCs' influence as institutional carriers via smart disclosure. Suppliers with high centrality within their GSC networks have greater interaction and collaboration with various actors across these networks (Ahuja, 2000; Potter & Wilhelm, 2020). This strategic positioning drives them to be more receptive to MNCs' influence as institutional carriers when smart disclosure places them in visible spots. Specifically, high-centrality suppliers are acutely aware of the potential risks of noncompliance and the benefits of compliance. They recognize that adherence to institutional norms enhances their reputations and opens the door to various compliance rewards (Lee, 2013; Sodhi & Tang, 2019). For instance, suppliers with high centrality can utilize compliance behaviors to cultivate the trust of MNCs and other global clients. This trust, in turn, can translate into increased economic advantages, such as securing additional contracts and attracting a broader client base. Conversely, noncompliance behaviors will likely reach more actors in their networks, including clients, potentially resulting in more severe sanctions (Choi & Kim, 2008). Consequently, suppliers with higher centrality are more likely to respond to MNCs' smart disclosure by displaying greater diligence to avoid human rights violations. In contrast, suppliers isolated in their GSC networks face reduced scrutiny and are likely less motivated to address such institutional pressures, even with increased visibility.

In addition, high-centrality suppliers can tap into various resources and support extended by other actors to achieve compliance (Koka & Prescott, 2008). Safeguarding human rights can be a resource-intensive endeavor that involves considerable costs and challenges for many suppliers (Wilhelm et al., 2016). It includes overhauling existing processes and conducting regular training and audits, all of which require knowledge and financial resources. Moreover, a central position enables suppliers to notice early warnings of compliance failure and promptly obtain emerging external resources (Bell, 2005). This rapid access to external support strengthens suppliers' capacity to respond effectively to heightened visibility. In contrast, suppliers with low centrality occupy fewer strategic positions and connections to other actors, resulting in constrained reach and support within their GSC networks. As a result, these suppliers might be less motivated to actively align their actions with compliance standards regarding human rights. Hence, we propose:

Hypothesis 2 The negative association between an MNC's smart disclosure of GSC information and a focal supplier's human rights violations is stronger if the supplier has higher centrality in its GSC network.

Supplier-country civil society development

Civil society refers to distinct, independent entities beyond government and business to drive change and nurture societal dialogue (Teegen, Doh, & Vachani, 2004). It encompasses various institutions driven by common values and goals, including NGOs and community groups. Civil society development varies widely across countries. We argue that suppliers from countries with more developed civil society organizations tend to be more receptive to MNCs' role as institutional carriers as the institutional pressures they face are more aligned, hence magnifying smart disclosure's visibility-enhancing mechanism in reducing suppliers' human rights violations.

First, stakeholders in supplier countries with stronger civil society development tend to be more responsive to enhanced visibility of GSCs and associated human rights issues. They can thus amplify the compliance pressure and incentives resulting from smart disclosure-generated visibility for suppliers. In such an environment, civil society institutions like NGOs are more likely to influence public opinion through their role as "social watchdogs" (Burchell & Cook, 2013). Indeed, NGOs frequently pressure firms to be socially responsible through "naming and shaming" campaigns (Fransen, 2013). As the influence of civil society increases, the number of channels available to communicate suppliers' behavior to global stakeholders increases as well. This coalition between stakeholders likely helps suppliers understand the legitimacy they can gain from compliance (Oliver, 1991; Raaijmakers, Vermeulen, Meeus & Zietsma, 2015). Anticipating that stakeholders are paying greater and timely attention to human rights violations, suppliers are more likely to avoid and provide effective remedies for human rights issues. Conversely, suppliers can more easily discount visibility-stimulated compliance behaviors in countries with weak civil society development. Without a civil society's active interaction with the public, information on human rights violations is less likely to be dispersed among stakeholders (Narula, 2019; Wang & Li, 2019). Given the high costs of tackling human rights issues, suppliers are less likely to respond to pressure if information on their human rights violations does not reach interested stakeholders.

Second, after visibility increases, suppliers in countries with stronger civil society development are better positioned to receive more support to address human rights initiatives. Countries with stronger civil society development possess supplementary resources to support suppliers in achieving compliance, driven by the diffused expectations and pressure from MNCs. In countries with a well-developed civil society, greater awareness and commitment to human rights foster a shared mindset among citizens (Islam, Deegan, & Haque, 2021). In our context, this reasoning implies that a more advanced civil society can establish an environment

that encourages suppliers to adhere to social expectations triggered by increased visibility from MNCs' smart disclosure. For instance, the United Nations Voluntary Trust Fund has funded projects in 30 countries to provide essential assistance and protection to trafficking survivors (United Nations, 2023). These resources complement MNCs' role as institutional carriers by supporting their efforts to influence suppliers in upholding human rights. Consequently, in countries with a developed civil society, the heightened supplier visibility brought about by MNCs' smart disclosure can prove more effective in engaging stakeholders to collaborate and assist suppliers in safeguarding human rights. On the contrary, suppliers in countries characterized by weaker civil society support face heightened limitations in effectively adhering to institutional pressures, even as their visibility increases. Hence, we propose:

Hypothesis 3 The negative association between an MNC's smart disclosure of GSC information and a focal supplier's human rights violations is stronger if the supplier is located in a country with stronger civil society development.

Figure 1 illustrates our theoretical framework.

Methods

Research context

We test our arguments within the global apparel industry, which comprises firms designing, producing, and selling clothing and footwear, accounting for 6.3% of world manufacturers' export value (World Trade Organization, 2019). The global apparel industry serves as an excellent context to test our arguments for two main reasons. First, human

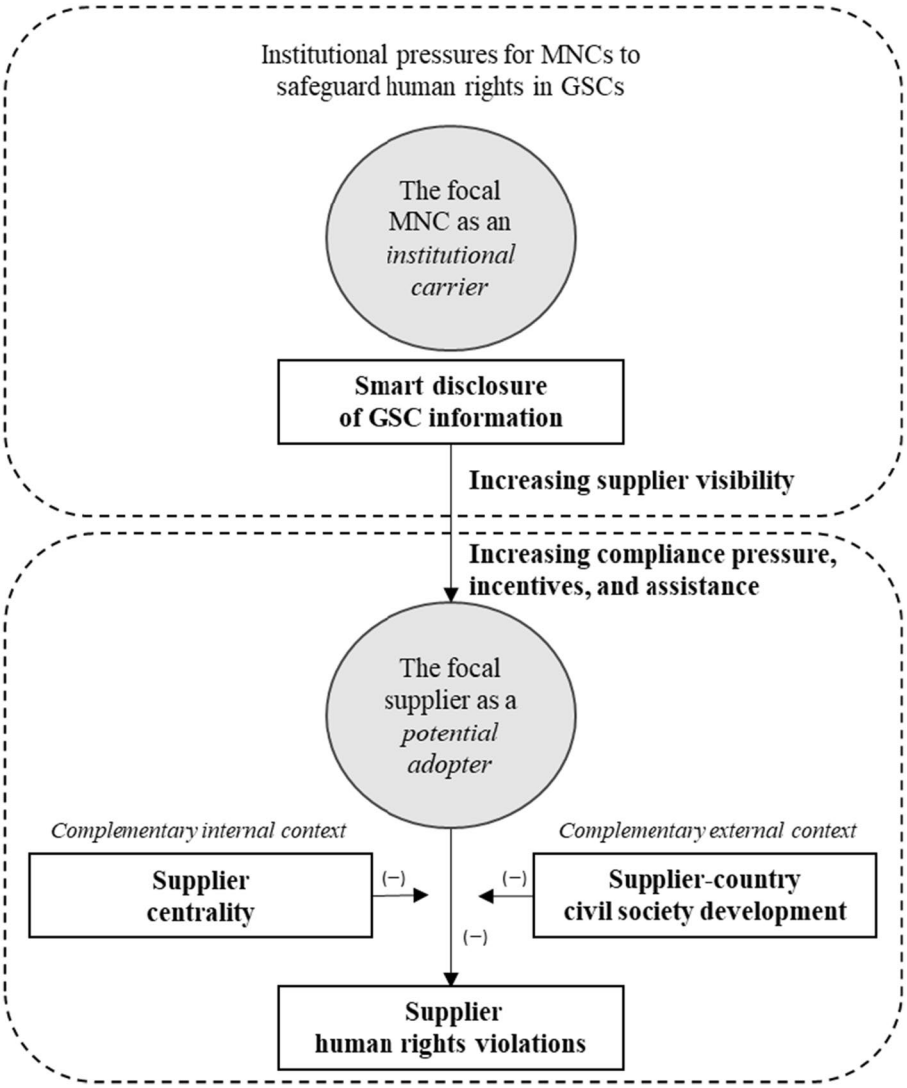


Fig. 1 Theoretical framework

rights violations are ubiquitous in the global apparel industry (Human Rights Watch, 2019), and understanding solutions to eliminate human rights violations in this industry is particularly meaningful. The GSCs in the apparel industry are enormous and extremely fragmented, mostly located in developing countries. Second, there is a shared expectation that MNCs need to hold human rights protection in GSCs in the global apparel industry, particularly after the 2013 Rana Plaza incident. The Rana Plaza incident is one of the deadliest workplace-related accidents in which a garment factory collapsed in Bangladesh, injuring over 3500 workers. After this incident, numerous initiatives have emerged, and many organizations have increased their promotion of human rights protections in the industry (e.g., Clean Cloth Campaign, etc.). Media attention on human rights issues in the global apparel industry has also grown exponentially (Williamson & Lutz, 2020). Consequently, the Rana Plaza incident "was a wake-up call to the world" (Human Rights Watch, 2019: 1) to push for higher sustainability standards across the GSC.

Data

We compiled a dataset from multiple sources. First, we obtained global apparel MNC lists from Compustat using Standard Industrial Classification (SIC) codes. Specifically, we searched for firms listed under SIC codes 2300 (Apparel and Other Finished Products), 3020 (Rubber and Plastics Footwear), and 5600 (Retail – Apparel and Accessory Stores). Second, we hand-collected MNCs' smart disclosure of GSC information from MNCs' official websites and annual reports. We mainly used the Wayback Machine website to collect yearly data (archive.org, 2022). Founded by the Internet Archive, the Wayback Machine is a digital library that keeps screenshots of past Internet websites for users to view. We searched alternative data sources for MNCs with missing archived screenshots, including annual reports and other online sources. Third, we obtained data on MNC–supplier relationships from FactSet, which arguably provides the broadest coverage of multi-tier supply chain relationships. The dataset includes direct relationships (e.g., relationships disclosed by clients) and reverse relationships (relationships disclosed by suppliers instead of clients), allowing us to collect comprehensive data on supply chain relationships (FactSet, 2014). Fourth, we obtained information on suppliers' human rights violations from RepRisk. RepRisk screens content from more than 100,000 public sources, including media and governments, to identify worldwide environmental, social, and governance (ESG) incidents (RepRisk, 2020). Fifth, we obtained firm-level control variables from Compustat, ASSET4, and hand-coded data. Finally, we collected country-level data from the Heritage Foundation's Economic Freedom Index (EFI), the World Bank, and the Yearbook of International Organizations.

After combining the data from these databases and removing missing values, we obtained 8527 observations at the MNC-supplier-year-level for 2014–2020. These observations represent 3058 MNC–supplier pairs, including 102 MNCs from 19 countries and 1136 suppliers from 58 countries.

Variables and measurements

Dependent variable

We collected the dependent variable, *supplier human rights violations*, from the RepRisk database. Specifically, we counted the number of human rights violations a focal supplier had committed. We focused on a broad range of human rights-related issues, including human rights abuses and corporate complicity, child labor, discrimination in employment, forced labor, poor employment conditions, freedom of association and collective bargaining, occupational health and safety, social discrimination, impacts on communities, and local participation. Following prior studies (Wang & Li, 2019), we weighted the number of incidents by severity and reach using {high = 5, medium = 3, low = 1}. RepRisk classifies and provides three levels of severity and reach: high, medium, and low. The level of severity is determined based on the negative consequences (e.g., the severity of injuries, number of people impacted, etc.), and the level of reach is assessed based on the type of information source. For instance, low-reach sources include local media outlets, while high-reach sources include global media outlets like *The New York Times* (RepRisk, 2020). The final measure is a continuous and time-variant variable, with a higher value representing more substantial violations.

Independent variable

The independent variable is a focal MNC's *smart disclosure of supply chain information*. We hand-collected information about the four properties of smart disclosure from firms' websites, annual reports, and social media channels. Consistent with prior research, we used the Wayback Machine website to examine past website archives (e.g., Dushnitsky, Piva, & Rossi-Lamastra, 2022; Hans & Vissa, 2023). We substituted the missing data with data from the closest year. Our research assistants coded related information, and then the coauthor team worked to resolve any remaining disagreements. We measured the four properties of smartness as follows.

To measure the first property – *data accessibility,* we first counted the number of steps required to navigate from the

home page of an MNC's official website to the page where its supplier information files could be located and downloaded. We then reverse-coded the data by subtracting the step count from our sample's maximum number of steps plus 1 (i.e., which equaled 6), with larger numbers indicating greater accessibility. For instance, in 2019, Esprit's accessibility score was 3 (i.e., $6-3=3$) because it took three steps to reach the supplier information file: [Sustainability → Transparent supply chain → Supplier list].

To measure the second property – *data programmability,* we counted the number of raw supplier information items provided by the firm. For instance, in 2017, Nike's programmability score was 9 because its supply chain disclosure included nine items: supplier name, country, street address, contact information, number of workers in each factory, gender ratio, events, product types, and subcontractors.

To operationalize the third property – *data interactivity,* we counted the number of social media banners a focal MNC utilizes to facilitate information users' sharing and posting of related GSC information. We first identified whether the MNC's website provided a feature that allows users to share the information directly on their social media accounts. We then counted the number of social media banners included for this purpose. For example, in 2019, H&M's interactivity score was 4 because the company provided four social media banners (LinkedIn, Facebook, Pinterest, and Twitter) that users could simply click to post the supplier information data.

To measure the fourth property – *data standardizability,* we gauged a focal MNC's connections with key internationally renowned initiatives that provide guidance and requirements for disclosing GSC information. Specifically, we evaluated whether the focal MNC was explicitly connected with two international initiatives: (1) the United Nations Global Compact (UNGC) and (2) the FLA. We focused on the UNGC and FLA because of their well-established reputations for guiding GSC information disclosure. For instance, UNGC highlights the importance of supply chain traceability and provides actionable steps for firms to enhance traceability (UNGC, 2014). Similarly, the FLA provides a template that guides partner firms on what supplier information needs to be disclosed. Thus, our final measure of standardizability is a count variable on a scale from 0 to 2, with a higher value indicating greater data standardizability. For instance, in 2019, Nike's data standardizability score was 2 because it was associated with both initiatives. Table 1 summarizes the measures and examples we used.

Once we measured each property of smart disclosure, we computed a factor score to serve as the final measure of smart disclosure using a principal-component factor analysis with direct oblimin rotation (Conway & Huffcutt, 2003). Before running the factor analysis, we standardized the value of each property, ensuring that all properties were aligned on a consistent metric. The factor analysis results show that the four properties load onto a single factor (eigenvalue 2.74; 68% variance explained; Cronbach's alpha: 0.83). As detailed in Online Appendices B–C, we took several steps, including a survey with a panel of experts, exploratory factor analysis, and confirmatory factor analysis, to test the content, convergent, and divergent validity of our measure.

Moderators

To measure the first moderator – *supplier degree centrality,* we followed prior studies have measured degree centrality by summing up the inward and outward direct ties a focal subject has with others (Potter & Wilhelm, 2020; Shah, 2000). Specifically, we measured this variable by counting the clients and suppliers directly connected to the focal supplier (log-transformed). We retrieved relevant data from the FactSet database. To measure the second moderator – *supplier-country civil society development*, we counted the number of NGOs affiliated with each country (log-transformed) (Surroca, Tribó, & Zahra, 2013), which we obtained from the Yearbook of International Organizations.

Control variables

We included control variables at the MNC, supplier, and country levels to address potential confounding effects (see Online Appendix D for detailed measures and data sources). At the MNC level, we first included three variables reflecting MNCs' resources as MNCs with more resources usually have more capacity to stimulate sustainable practices among suppliers (Wilhelm et al., 2016): (1) *MNC financial performance*, measured as return on assets; (2) *MNC size*, measured as the logarithm of total assets; and (3) *MNC leverage*, measured as net debt to equity. Second, existing research has identified executives' influence on firms' sustainability strategies (Chin, Hambrick, & Treviño, 2013); we thus included *CEO ESG incentive* to capture whether a company had a CEO incentive linked to firm sustainability targets. Third, prior research has emphasized that MNCs' stakeholder orientation drives their associated behaviors and performance (Berman, Wicks, & Jones, 1999). We controlled for *MNC sustainability orientation*, measured as the average value of six items related to the focal MNC's sustainability orientation provided by ASSET4. Fourth, we accounted for *MNC controversies* using the overall controversies score provided by ASSET4 to control for a firm's susceptibility to social issues. Lastly, we recognized the need to consider the effect of *non-smart disclosure amount*. First, we downloaded MNCs' yearly CSR reports (or overall annual reports in case

Table 1 Conceptualization and operationalization of smart disclosure

Properties	Measures	Examples in our paper
Intelligence provided to all possible information users		
Data accessibility	Count variable (reverse coded): The number of steps required from the home page of the official website to reach the supply chain data (we subtracted the value from the maximum steps in our sample, i.e., 5, and added 1 for ease of interpretation. Thus, higher values indicate greater accessibility.)	*High accessibility* In 2018, it took only two steps [Home page → Sustainability → July 2018 Supplier List Disclosure] to locate supplier information on the Under Armour website. *Low accessibility* In 2018, it required five steps [Home page → Sustainability → Compliance → Supply chain approach → Supply chain structure → Global supplier list] to reach the supply chain information on the Adidas website.
Data programmability	Count variable: The number of items of raw information (e.g., name, country, street address, product type, worker information, etc.) the company provided in the disclosure Alternative measure: The number of items of raw information multiplied by the number of data formats (e.g., Excel, PDF, JSON) the company provided in the disclosure	*High programmability* In 2017, Nike provided raw data that consisted of supplier name, country, street address, contact information, number of workers in each factory, worker gender ratio, event, product types, and subcontractors. *Low programmability* In 2017, PVH Corp. provided only the name and country of suppliers. *High programmability* In 2017, Nike provided raw data in three data formats: Excel, PDF, and JSON, and nine items of information in total. *Low programmability* In 2017, PVH Corp. provided only one type of data format and two items of information.
Interconnectivity with all possible information users		
Data interactivity	Count variable: The number of social media links the company offers users to directly share the supply chain information Alternative measure: (1) The number of tweets the company posted on Twitter related to the supply chain; (2)The use of interactive maps	*High interactivity* In 2019, H&M provided a social media banner that users could readily click to post/share information about supply chain disclosure through LinkedIn, Facebook, Pinterest, and Twitter. *Low interactivity* In 2019, ASICS did not provide direct links to users to share the information on their social media. *High interactivity* Score 21: In 2019, H&M posted 21 tweets related to the supply chain on Twitter. *Low Interactivity* In 2019, ASICS did not post any tweets related to the supply chain on Twitter.
Data standardizability	Count variable: The number of associated specialized initiatives that provide guidance for supplier information disclosure (i.e., FLA and UNGC)	*High standardizability* In 2019, Nike listed its compliance with the FLA and UNGC when disclosing information on suppliers. *Low standardizability* Prada has no association with FLA or UNGC.

the CSR report was not available). Following prior studies (Benton, Adam Cobb, & Werner, 2022; Wang, Wijen, & Heugens, 2018), we then counted the total number of words in unformatted texts presented in the supply chain information section as a proxy of "non-smart" disclosure.

We also controlled for the following supplier-level time-variant variables obtained from the FactSet database. First, we controlled for *focal supplier substitutability* in an MNC's GSC network because bargaining power might affect a supplier's compliance pressure (Kim & Davis, 2016). We calculated the proportion of the MNC's supply chain occupied by a focal supplier using the reciprocal value of the total number of suppliers the MNC had. We reverse-coded the variable so that a higher value indicates greater substitutability. Second, we controlled for *multi-establishment supplier,* measured as whether a focal supplier had subsidiaries, given that suppliers with multiple establishments might have more difficulties monitoring and regulating the environment (King & Shaver, 2001). The dummy variable equals 1 when the focal supplier had more than one subsidiary and 0 otherwise. Third, we included *supplier long-term contracts* by counting the number of long-term contracts (3 years or more) a focal supplier had in a year based on the FactSet data. Suppliers with long-term contracts may have more incentives and power, which can affect their compliance tendencies (Lusch & Brown, 1996). As a robustness check, we controlled for supplier-specific effects. Since fixed effects of negative binomial regression may not represent "true fixed effects" (Allison & Waterman, 2002), we instead included a presample mean of suppliers' human rights violations calculated as the average of each supplier's human rights violations in the past 5 years of our research period (i.e., 2009–2013) (Keil, Maula, Schildt, &Zahra, 2008). We found broadly similar results.

Regarding country-level controls, we controlled for MNC home-country conditions because varying social and economic development in a firm's home country can affect its sustainable practices (Surroca et al., 2013). *MNC home-country GDP per capita* is provided by the World Bank; *MNC home-country civil society* is measured as the number of NGOs affiliated with each country (log-transformed). We accounted for *supplier-country institutional voids* to capture the degree to which the country where a focal supplier is located lacks market-supporting institutions. Like in prior literature (Slangen & Beugelsdijk, 2010), we used the EFI score (reverse-coded) to measure the focal supplier's home country's institutional quality level.

Estimation methods

Our unit of analysis is the MNC-supplier-year. The dependent variable, *supplier human rights violations*, consists of nonnegative integer values. To deal with the overdispersed dependent variable (mean = 3.28, SD = 20.76), we applied random effects negative binomial regression analysis, which allows the Gamma distribution to address the overdispersion (Hausman et al., 1984; Keil et al., 2008; Phene & Almeida, 2008). We mean-centered continuous variables in the interaction terms to prevent multicollinearity issues. To alleviate reverse-causality concerns, we used a 1-year lag for all our independent and control variables.

We followed prior literature (Guillén & Capron, 2016; Maksimov, Wang, & Yan, 2019) to address potential endogeneity bias. We identified instrumental variables and conducted a two-stage residual inclusion (2SRI) approach, using residuals from the first stage as a control in the second stage. For our instrumental variables, we used the two variables related to MNC home-country information and communication technology (ICT) development provided by the World Bank: (1) *secure internet servers*, measured as the number of secure internet servers (per 1 million people) (log-transformed), and (2) *communication service import*, measured as the ratio of computer and communication services among total commercial service imports. The ICT level in a country is related to MNCs' smart disclosure because companies need to utilize the internet, digital technologies, and telecommunication to enable worldwide information transmission (Chaudhary, Pundir, & Goel, 2013; Mott & Sheldon, 2000). However, in theory, an MNC's home-country ICT development has little association with global suppliers' human rights violations. In Table 3, Model 1 shows the first-stage results (i.e., *smart disclosure of supply chain information* as the dependent variable), and the rest of the models show the second-stage results. The residuals from the first stage were included in the other models. In the first stage (Model 1), the F-statistic is 67.13, significantly above Stock and Yogo's (2005) critical value of 19.93 for two instruments (the desired maximal size $(r) = 0.10$), indicating that the MNC home-country ICT development variables are statistically relevant instruments. Moreover, the residual from the first stage is significant in Models 2–5 ($p = 0.000$), indicating the usefulness of the instrumental variables in addressing potential endogeneity (Maksimov et al., 2019). We also conducted the Wu-Hausman test and found a significant p value for the predicted value of the independent variable when included in the second stage with the instrumental variables. Finally, we verified overidentifying restrictions through the Sargan-Hansen test assuming a linear model and found a nonsignificant p value. All these efforts ensure the appropriateness of our instrumental variables.

Table 2 Descriptive statistics and correlation matrix

		Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Supplier human rights violations	3.283	20.761	1.000																
2	Smart disclosure of supply chain information[a]	0.000	1.000	−0.058	1.000															
3	Supplier degree centrality[b]	2.394	0.996	0.393	−0.093	1.000														
4	Supplier-country civil society development[b]	7.935	0.398	0.083	−0.098	0.113	1.000													
5	MNC financial performance	0.093	0.087	−0.046	0.077	−0.155	−0.020	1.000												
6	MNC size[b]	9.110	1.688	−0.085	0.405	−0.186	−0.128	0.208	1.000											
7	MNC leverage	0.508	0.055	0.008	0.059	−0.040	−0.005	0.171	0.044	1.000										
8	CEO ESG incentive	0.420	0.204	−0.008	0.141	−0.009	−0.021	−0.007	0.017	−0.012	1.000									
9	MNC sustainability orientation	0.715	0.163	−0.062	0.408	−0.157	−0.079	0.291	0.343	−0.031	0.137	1.000								
10	MNC controversies	0.887	0.225	0.027	−0.296	0.063	0.003	0.054	−0.101	−0.021	0.139	−0.134	1.000							
11	Non-smart disclosure amount[b]	5.727	2.778	−0.034	0.316	−0.081	−0.067	0.132	0.141	−0.033	0.099	0.331	−0.115	1.000						
12	Focal supplier substitutability	−0.045	0.070	−0.057	0.306	−0.063	−0.014	0.115	0.229	−0.023	0.065	0.387	−0.135	0.182	1.000					
13	Multi-establishment supplier	0.107	0.310	0.124	−0.010	0.246	0.063	−0.090	−0.034	−0.054	0.007	−0.081	0.032	−0.035	−0.008	1.000				
14	Supplier long-term contracts	2.202	3.330	0.065	−0.075	0.346	0.058	−0.059	−0.121	0.006	−0.016	−0.083	0.024	−0.052	−0.012	−0.058	1.000			
15	MNC home-country GDP per capita[b]	10.804	0.474	−0.057	0.140	0.052	0.062	−0.157	−0.168	−0.038	−0.003	0.011	−0.079	0.098	0.157	0.028	0.075	1.000		
16	MNC home-country civil society development[b]	8.084	0.486	−0.066	0.168	−0.036	0.059	0.117	−0.081	−0.036	0.059	0.122	−0.099	−0.045	0.231	−0.034	0.008	−0.094	1.000	
17	Supplier-country institutional voids	27.300	8.012	−0.046	0.041	−0.035	−0.169	0.040	0.058	0.007	0.023	0.047	0.018	0.032	−0.021	−0.026	−0.078	−0.136	−0.056	1.000

Observations = 8527.

[a]Factor score.

[b]Variables are log-transformed.

Table 3 The enabling effect of MNCs' smart disclosure of GSC information: negative binomial regression results

	1st stage	2nd stage			
	Model 1	Model 2	Model 3	Model 4	Model 5
Smart disclosure of GSC information		−0.652	−0.545	−0.614	−0.540
		[0.000]	[0.001]	[0.000]	[0.001]
Smart disclosure ×			−0.092		−0.074
Supplier degree centrality			[0.003]		[0.024]
Smart disclosure ×				−0.281	−0.207
Supplier-country civil society development				[0.005]	[0.045]
MNC home-country	0.110				
secure internet servers	[0.000]				
MNC home-country	0.037				
communication service import	[0.000]				
Supplier degree centrality	0.040	1.512	1.498	1.509	1.497
	[0.042]	[0.000]	[0.000]	[0.000]	[0.000]
Supplier-country civil society development	−1.420	−0.581	−0.532	−0.507	−0.483
	[0.067]	[0.019]	[0.028]	[0.042]	[0.048]
MNC financial performance	−0.083	−0.072	−0.049	−0.017	−0.020
	[0.495]	[0.860]	[0.903]	[0.967]	[0.961]
MNC size	−0.216	−0.117	−0.116	−0.119	−0.117
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
MNC leverage	0.149	1.611	1.536	1.600	1.535
	[0.196]	[0.013]	[0.016]	[0.014]	[0.016]
CEO ESG incentive	0.079	−0.296	−0.251	−0.287	−0.251
	[0.013]	[0.037]	[0.079]	[0.043]	[0.080]
MNC sustainability orientation	0.199	−0.156	−0.189	−0.189	−0.199
	[0.013]	[0.516]	[0.435]	[0.435]	[0.414]
MNC controversies	0.026	0.179	0.177	0.189	0.180
	[0.328]	[0.181]	[0.195]	[0.157]	[0.185]
Non-smart disclosure amount	0.005	−0.026	−0.027	−0.026	−0.027
	[0.087]	[0.030]	[0.025]	[0.034]	[0.027]
Focal supplier substitutability	−0.080	0.090	0.159	0.105	0.157
	[0.594]	[0.863]	[0.761]	[0.842]	[0.764]
Multi-establishment supplier	−0.013	0.312	0.315	0.302	0.310
	[0.614]	[0.000]	[0.000]	[0.000]	[0.000]
Supplier long-term contracts	0.008	0.012	0.012	0.011	0.011
	[0.065]	[0.233]	[0.226]	[0.267]	[0.249]
MNC home-country GDP per capita	0.616	0.345	0.344	0.330	0.335
	[0.000]	[0.011]	[0.010]	[0.015]	[0.012]
MNC home-country civil society development	3.160	1.993	1.933	1.943	1.911
	[0.002]	[0.000]	[0.000]	[0.000]	[0.000]
Supplier-country institutional voids	−0.013	−0.001	−0.000	0.000	0.000
	[0.013]	[0.905]	[0.964]	[0.967]	[0.964]
Residual from the first stage		0.691	0.673	0.679	0.668
		[0.000]	[0.000]	[0.000]	[0.000]
Constant	−21.763	−21.533	−17.868	−25.575	−21.819
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Log-likelihood	−1698.831	−6579.684	−6575.264	−6575.714	−6573.238
F statistics	67.132				
Wald test chi2		2218.274	2531.328	2215.869	2498.883
P value > chi2	0.000	0.000	0.000	0.000	0.000

Table 3 (continued)

	1st stage	2nd stage			
	Model 1	Model 2	Model 3	Model 4	Model 5
Observations	8527	8527	8527	8527	8527

p values are in brackets.

Results

Table 2 shows the descriptive statistics and the correlation matrix for the variables. We examined the variance inflation factors (VIFs) for the independent, moderator, and control variables. The mean VIF is 1.26, and *smart disclosure of supply chain information* has the largest average VIF of 1.69, demonstrating that multicollinearity is not a concern.

Table 3 shows the results of the negative binomial regression analysis. Model 1 shows the first-stage results, and the other models show the second-stage results. In Models 2–5, each coefficient indicates how much the difference in the logs of the expected counts of *supplier human rights violations* is expected to change when the predictor increases by one unit, all else being equal. Hypothesis 1 predicts a negative association between MNCs' smart disclosure and suppliers' human rights violations. The results in Model 2 corroborate Hypothesis 1 because the effect is negative and statistically significant ($\beta = -0.652$, $p = 0.000$). When an MNC's smart disclosure (i.e., a factor score of four attributes) increases by one point, suppliers' human rights violations are expected to decrease by 47.9% ($= [\exp(-0.652) - 1] \times 100$), holding the other variables constant. As an illustration, with a one-unit increase in the MNC's smart disclosure, the number of human rights violation incidents is expected to decrease to 1.710 ($= 3.283 \times [1 - 0.479]$) for a supplier with 3.283 (sample mean) human rights violations.

We further investigated whether the main effect of an MNC's smart disclosure on suppliers' human rights violations is moderated by *supplier degree centrality* and *supplier-country civil society development* (Models 3–4). Interaction plots are presented in Figure 2. Hypothesis 2 predicts that a higher degree centrality of a focal supplier enhances the effect of an MNC's smart disclosure on the supplier's human rights violations. Model 3 shows that Hypothesis 2 is supported: the coefficient of the interaction term between *smart disclosure of supply chain information* and *supplier degree centrality* is negative and statistically significant ($\beta = -0.092$, $p = 0.003$). The coefficients of the interaction terms indicate the impact of a one-unit increase in a moderator on the slope of the independent and dependent variables, all else being equal. As shown in Figure 2a, the slope is steeper at higher values of *supplier degree centrality*.

Hypothesis 3 predicts that higher civil society development in a focal supplier's home country enhances the effect of an MNC's smart disclosure on the supplier's human rights violations. Model 4 shows that Hypothesis 3 is supported: the coefficient of the interaction term between *smart disclosure of supply chain information* and *supplier-country civil society development* is negative and statistically significant ($\beta = -0.281$, $p = 0.005$). As shown in Figure 2b, the slope is steeper at higher values of *supplier-country civil society development.*

We also examined the individual effects of the four smart disclosure properties – *data accessibility, programmability, interactivity*, and *standardizability.* As shown in Table 4, every property has a negative and statistically significant effect on the dependent variable, *supplier human rights violations*, consistent with our main analysis. The results show that *standardizability* has the largest effect size, followed by *accessibility*, *interactivity,* and *programmability*. One plausible explanation is that our operationalization of data standardizability is inherently associated with key initiatives focused on promoting supply chain transparency, and this alignment profoundly bolsters the visibility-enhancing function of smart disclosure, which amplifies the compliance pressure that suppliers face.

Supplementary and robustness analyses

We performed several post hoc supplementary and robustness analyses. Due to space limitations, we presented detailed explanations and results in Online Appendix E, and here we simply listed the tests we performed. To begin with, we re-estimated our models with alternative measures. First, we re-calculated our independent variable, *smart disclosure*, using the sum of standardized components to construct a variable (E1). Second, we used the alternative weights to calculate our dependent variable, *supplier human rights violations* (E2). Third, we re-measured the *data programmability* by considering file formats and content aspects (E3–E4). Fourth, we re-estimated the results with two alternative measures for the *data interactivity* property: (1) the number of tweets related to smart disclosure (E5) and (2) a dummy that indicates whether an MNC provides an interactive tool (E6). Also, we conducted our analyses by dropping the interactivity property, considering the possible different influence of social media (E7). Fifth, we re-measured *focal supplier*

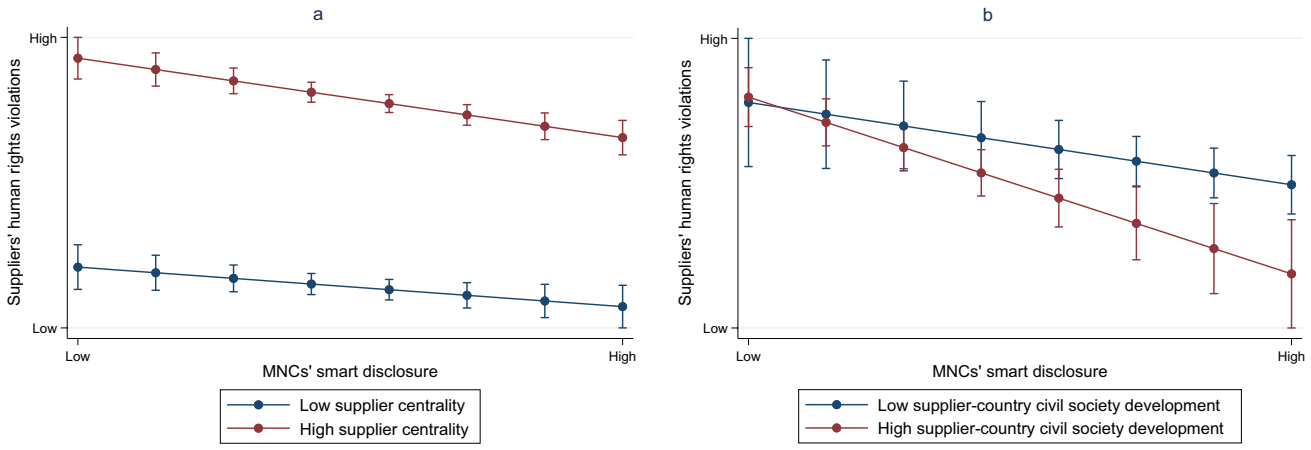
substitutability by counting the number of alternative suppliers contracted by other MNCs within the same industry based on SIC codes (E8). Furthermore, we reexamined our models by including additional control variables, including suppliers with multiple buyers (E9), supplier-specific effects (E10), and MNCs' home country institutional quality (E11). Last, we explored alternative estimation methods by employing (1) mixed-effect negative binomial regression (E12) and (2) two-stage least squares analyses (E13). Overall, our results remain largely consistent.

Discussion

With increasing attention to human rights violations in GSCs, MNCs, as institutional carriers, face mounting pressure to influence their suppliers to uphold human rights. However, the lack of visibility of suppliers, especially lower-tier suppliers, becomes a significant barrier for MNCs to pursue this endeavor (Wilhelm et al., 2016). Our paper defines the concept of smart disclosure and theorizes how MNCs' smart disclosure of GSC information triggers suppliers to reduce human rights violations due to heightened visibility among relevant stakeholders. This influence is more pronounced for suppliers with higher centrality within GSC networks and those located in countries with high civil society development. Our arguments are supported by the analyses of 8527 observations at the MNC-supplier-year level in the global apparel industry from 2014 to 2020.

We make the following contributions to the literature. First, we contribute to institutional theory by extending the understanding of MNCs' role as institutional carriers and the novel ways they generate visibility to shape firm compliance to institutional pressures. We provide answers to the classic questions institutional theory seeks to address: "why these [institutional] pressures are being exerted, who is exerting them, what these pressures are, how or by what means they are exerted, and where they occur" (Oliver, 1991: 159). Prior studies on MNCs' significance as institutional carriers have predominantly examined these firms' ability to transfer organizational practices, such as certifications and quality-management practices, to other relatively visible entities, such as their overseas subsidiaries (Guler et al., 2002; Kostova & Roth, 2002). However, a gap remains in our understanding of the mechanisms underlying how MNCs transmit norms and values to comparatively invisible entities, such as suppliers. Although the literature has documented how firms' compliance with institutional pressures arises from their heightened visibility (Chang & Milkman, 2019; Julian et al., 2008), a notable research gap exists regarding the specific mechanisms by which visibility is leveraged to induce compliance. We bridge this gap by introducing smart disclosure as a visibility-enhancing mechanism that helps MNCs fulfill their role as institutional carriers. The lack of supplier visibility has become an important issue as firms have developed increasingly dispersed GSCs. We highlight that this mechanism is particularly relevant when interconnected information gathering, sharing, and updating are critical to identifying potential adopters, such as suppliers in GSCs, that might otherwise remain invisible. We also provide boundary conditions, considering internal and external conditions that shape potential adopters' receptiveness to the norms transmitted by MNCs as institutional carriers.

Second, we contribute to the literature on sustainable supply chain management by deepening our understanding of how digital technology-mediated approach can be applied to address human rights issues. Specifically, we emphasize the importance of improving GSC visibility (Wilhelm



Note: The plots are based on Model 3 and Model 4 in Table 3 with 95% confidence intervals.

Fig. 2 Interaction plots

Table 4 The enabling effect of MNCs' smart disclosure of GSC information: four properties

	Model 6	Model 7	Model 8	Model 9
Accessibility	−0.858			
	[0.000]			
Programmability		−0.141		
		[0.000]		
Interactivity			−0.512	
			[0.000]	
Standardizability				−2.182
				[0.000]
Supplier degree centrality	1.547	1.499	1.496	1.543
	[0.000]	[0.000]	[0.000]	[0.000]
Supplier-country civil society development	−5.166	0.263	7.486	−8.643
	[0.000]	[0.026]	[0.000]	[0.000]
MNC financial performance	−0.950	0.120	−1.287	1.785
	[0.049]	[0.764]	[0.015]	[0.000]
MNC size	−0.624	−0.071	0.366	−0.271
	[0.000]	[0.010]	[0.000]	[0.000]
MNC leverage	1.534	1.633	1.542	1.725
	[0.017]	[0.012]	[0.017]	[0.008]
CEO ESG incentive	−0.068	−0.315	−0.325	−0.369
	[0.669]	[0.024]	[0.019]	[0.008]
MNC sustainability orientation	0.986	−0.327	−0.318	−0.497
	[0.003]	[0.188]	[0.186]	[0.048]
MNC controversies	0.052	0.192	0.273	0.064
	[0.698]	[0.153]	[0.046]	[0.632]
Non-smart disclosure amount	−0.023	−0.026	−0.043	−0.008
	[0.062]	[0.034]	[0.000]	[0.550]
Focal supplier substitutability	0.566	0.026	−0.279	0.406
	[0.283]	[0.960]	[0.598]	[0.436]
Multi-establishment supplier	0.323	0.305	0.306	0.358
	[0.000]	[0.000]	[0.000]	[0.000]
Supplier long-term contracts	0.023	0.010	−0.007	0.027
	[0.026]	[0.292]	[0.474]	[0.011]
MNC home-country GDP per capita	1.105	0.161	−0.656	1.423
	[0.000]	[0.126]	[0.000]	[0.000]
MNC home-country civil society development	16.444	0.541	−16.790	14.238
	[0.000]	[0.018]	[0.000]	[0.000]
Supplier-country institutional voids	0.000	−0.004	−0.011	0.025
	[0.993]	[0.542]	[0.096]	[0.000]
Residual from the first stage	0.866	0.144	0.557	2.261
	[0.000]	[0.000]	[0.000]	[0.000]
Constant	−105.439	−14.433	73.595	−66.609
	[0.000]	[0.000]	[0.000]	[0.000]
Log-likelihood	−6578.942	−6580.781	−6579.175	−6578.369
Wald test chi2	2309.807	2226.358	2299.839	2304.353
P value > chi2	0.000	0.000	0.000	0.000
Observations	8527	8527	8527	8527

p values are in brackets.

et al., 2016) and investigate the effectiveness of using a digital technology-mediated approach to increase visibility, as suggested in recent studies (George & Schillebeeckx, 2022; Meyer, 2023). Although scholars and practitioners have emphasized the role of digital technologies as tools to resolve global grand challenges (Ferraro, Etzion, & Gehman, 2015), a clear scholarly definition, a comprehensive theoretical framework, and a rigorous empirical operationalization are largely lacking in past work. We fill this void by conceptualizing and operationalizing the notion of smart disclosure of GSC information, which we believe will help advance future research on the role of technologies in addressing grand challenges including human rights violations.

Finally, our operationalization and empirical validation of smart disclosure contribute to the literature on information disclosure by delving into some nuanced aspects of disclosure. We expand on existing studies focusing on assessing the quantity and quality of information disclosure (e.g., Christensen, 2016) by exploring *how* information is generated and delivered in the disclosure process. While the quality and accuracy of information are undoubtedly important, we argue that it is also important to examine the manner in which information is generated, presented, and delivered to the intended audience (Ben-Shahar & Schneidern, 2014; Jin, Luca, & Martin, 2022). We fill the voids by shifting the focus from the mere substance of information to the broader context of smart disclosure, which allows information to be delivered in a readily accessible, programmable, interactive, and standardized manner.

Our paper provides important and timely practical implications for MNCs and policymakers. Although the smart disclosure of information is rapidly becoming the norm for MNCs in managing their complex GSCs (Fashion Revolution, 2022), it is unclear to managers whether such efforts can be effective. Our findings help managers understand how advances in digital technologies can underpin effective disclosure in eradicating human rights violations from their GSCs. For policymakers, our results demonstrate that policymakers can foster infrastructure for smart technologies (e.g., big data, blockchain-powered systems, software, social media, etc.) (Steelman et al., 2014). Our results also show that a strong civil society in supplier countries is an important complementary force that amplifies the effectiveness of MNCs' smart disclosure of supply chain information. Hence, supporting NGOs and building institutional intermediaries are essential for visibility-generated governance to be effective, which will, in turn, lessen human rights abuses.

Our paper has several limitations that pave the road for future research. First, we treated all MNCs as if they had faced the same pressure from stakeholders to uphold human rights in their GSCs. While we controlled for firm performance and sustainability orientation, future research can study the impact of firm heterogeneity – for example, whether certain firms are more inclined to disclose certain suppliers to reduce human rights violations. Moreover, it would be fruitful to explore how GSC structural dynamics, including different tier distributions in MNC–supplier relationships, impact the effectiveness of smart disclosure. Despite our efforts to gather extensive MNC–supplier relationship data from the FactSet database, we faced difficulty covering lower-tier suppliers in our sample. Future research could compare FactSet's supplier lists with those of MNCs to explore potential discrepancies. In addition, our data from publicly available channels allowed us to capture MNCs' disclosure-related actions but not necessarily their true motivations. Firms can disclose considerable information and still be involved in irresponsible and unsustainable incidents. Recognizing the possibility of sustainability decoupling (Tashman et al., 2019), we encourage future qualitative research to analyze MNCs' actions and suppliers' actual commitments in greater depth. Similarly, our sample was skewed toward large MNCs and large suppliers because of data availability. Data availability also constrained the ways we were able to test our proposed mechanisms. Finally, as an initial effort to conceptualize and operationalize smart disclosure, our measures of smartness were primitive. We encourage future research to explore this construct outside the GSC context and build on our operationalization to conduct more pilot tests with diverse samples.

Conclusion

Existing research has underscored that the lack of supplier visibility poses a primary obstacle for multinational corporations (MNCs) to tackle human rights violations within their global supply chains (GSC). To address this challenge, MNCs are increasingly adopting the concept of "smart disclosure" to enhance supplier visibility. However, its conceptualization, operationalization, and efficacy in reducing human rights violations, remain unclear. Filling this gap, we first draw on research about attributes of digital technologies and information disclosure to define and operationalize smart disclosure in the context of GSC. We then draw on insights from institutional theory to theorize that smart disclosure – as a visibility-enhancing mechanism – enables MNCs to fulfill the role of "institutional carriers" and effectively impose institutional pressures on suppliers, fostering an environment where suppliers' adherence to human rights standards is desired, supported, and rewarded. We further propose that this effect is stronger for suppliers with higher centrality in GSC networks and those in countries with greater civil society development. We found support for our arguments by analyzing 8527 observations at the

MNC-supplier-year level in the global apparel industry from 2014 to 2020.

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