

RESEARCH ARTICLE OPEN ACCESS

Sustainability Certifications as Strategic Tools: Environmental Accountability, Institutional Robustness and Global Convergence

Teresa Turzo¹  | Cecilia Chirieleison²  | Carmela Gulluscio¹  | Giacomo Marzi³ 

¹Department of Law and Economics, UnitelmaSapienza University of Rome, Rome, Italy | ²Department of Political Sciences, University of Perugia, Perugia, Italy | ³IMT School for Advanced Studies Lucca, Lucca, Italy

Correspondence: Cecilia Chirieleison (cecilia.chirieleison@unipg.it)

Received: 2 October 2025 | **Revised:** 20 May 2026 | **Accepted:** 1 July 2026

Keywords: certification standards | environmental accountability | ISO 14000 | stakeholder accountability | standard convergence | strategic accountability tools | sustainability certifications

ABSTRACT

Sustainability certifications are increasingly used as strategic tools to advance accountability for environmental sustainability. This study addresses the challenge of fragmented national certification standards by proposing and applying a replicable method to assess the structural robustness and convergence of industry-specific sustainability certification standards toward global benchmarks. The study develops and tests a five-step method combining qualitative assessment and quantitative comparison to evaluate the robustness of industry-specific national certification standards and their degree of alignment with international benchmarks. The method integrates a framework-based comparative analysis, a dummy variable index, a gap analysis and robustness checks focused on audit mechanisms, enforcement provisions and international applicability. The ISO 14000 series serves as the reference benchmark. Although the empirical application is industry-specific, the method is strategically designed for transferability across sectors and fragmented certification environments. The results reveal varying levels of institutional robustness among national standards and indicate selective alignment with internationally recognised structural features in a limited number of cases, consistent with early harmonisation pressures, rather than full-scale convergence toward a globally recognised model. The study contributes to research on sustainability standards, environmental policy and stakeholder accountability by offering a structured approach to assess certification robustness and institutional alignment.

1 | Introduction

Sustainability certification standards are increasingly used by companies as strategic tools to align their operations with the United Nations Sustainable Development Goals (SDGs), particularly Goal 12 ‘Responsible Consumption and Production’ and Goal 13 ‘Climate Action’ (Cao et al. 2019). These standards offer structured tools to reduce environmental impact, formalise sustainability commitments and enhance environmental accountability through measurable and verifiable practices (Connelly et al. 2011; Gilbert and Rasche 2007; Nardo et al. 2005). Furthermore, sustainability certification standards function as

instruments of indirect accountability, as they translate broad sustainability commitments into operational requirements that are clear, measurable and subject to external verification (Visser 2010). They also serve strategic signalling purposes, allowing companies to demonstrate alignment with global norms and improve their legitimacy in competitive or institutionally sensitive environments (O'Regan and Ghobadian 2002; O'Regan and Ghobadian 2004; Turzo et al. 2024). The results are enhanced transparency, increased legitimacy of sustainability efforts and a clear signal of the company's alignment with internationally recognised principles (Connelly et al. 2011; Gehman et al. 2017).

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2026 The Author(s). *Business Strategy and the Environment* published by ERP Environment and John Wiley & Sons Ltd.

Alongside cross-sectoral certification models such as ISO 14001 for environmental management and SA8000 for labour standards, there is a growing trend toward developing sector-specific certification standards that address sustainability challenges unique to individual industries. These industry-specific certifications operate in parallel with general-purpose standards and respond to the need for more tailored, operationally relevant sustainability tools. Although a few industries, such as the chemical sector, have consolidated around globally recognised certification models (Gamper-Rabindran and Finger 2013), others continue to lag behind, with multiple national standards co-existing without international coordination. This fragmentation limits both the legitimacy and recognition potential of certification standards, reducing incentives for adoption and comparability (Pedersen et al. 2013).

Existing research has shown that sustainability certification standards can function as governance instruments that support accountability, external credibility and organisational alignment with broader sustainability expectations (Connelly et al. 2011; Gehman et al. 2017; Gilbert and Rasche 2007; Martinez 2025). It has also highlighted that certification fields often evolve unevenly across sectors and countries, with some industries moving toward more consolidated models, whereas others remain fragmented across multiple national or subnational initiatives (Gamper-Rabindran and Finger 2013; Pedersen et al. 2013). At the same time, recent studies have examined sustainability standards and certification schemes in fragmented institutional environments, highlighting issues of governance, institutional design, compliance, credibility and stakeholder trust (Ares-Sainz et al. 2025; Corbett and Kirsch 2001; Depoorter and Marx 2024; Ladu et al. 2025; Marx et al. 2024; UNCTAD 2020a, 2020b). However, the literature provides more limited guidance on how to assess, in a structured and replicable way, the structural robustness of sector-specific certification standards and their degree of alignment with internationally recognised benchmarks. Against this background, the objective of this study is twofold: first, to develop a replicable method for assessing the structural robustness of sector-specific sustainability certification standards, and second, to apply this method to evaluate whether existing national standards in the film industry show signs of alignment with an internationally recognised environmental benchmark. The film industry offers an appropriate illustrative case for this purpose. Despite its substantial environmental footprint and its growing engagement with sustainability initiatives, it remains underexplored from the perspective of certification standards. Film production involves high levels of resource consumption, complex supply chains and extensive mobility, all of which contribute to its environmental footprint. According to data from the British Academy of Film and Television Arts (BAFTA), a single high-budget film can emit over 2800 tons of CO₂, an amount equivalent to the annual carbon footprint of several thousand individuals (Albert 2020; Maxwell and Miller 2012). Although several studies have examined sustainability in relation to film content or audience behaviour, limited attention has been paid to how production companies measure, report and manage their environmental impacts using structured tools such as certification standards (Elalfy et al. 2021; Raimi et al. 2015). For these reasons, the film industry offers an effective illustrative case for applying the proposed method and examining whether existing industry-specific certification

standards show different degrees of structural robustness and signs of alignment with globally recognised models.

Beyond its empirical application to the film industry, this study also makes a methodological contribution. Methodologically, the framework proposed in this study builds on the composite indicator and sustainability assessment literature, which has long combined qualitative dimension selection with quantitative scoring, aggregation and robustness analysis (Bell and Morse 2010; Moldan et al. 2012; Nardo et al. 2005; OECD et al. 2008). It also relates to emerging approaches for the structured assessment of voluntary sustainability standards, such as the UNCTAD VSS Assessment Toolkit (UNCTAD 2020a, 2020b), and to research on the design, credibility and governance of certification frameworks (Corbett and Kirsch 2001; Delmas and Montes-Sancho 2010). These two traditions, however, have rarely been integrated into a replicable method for assessing both the structural robustness of certification standards and their degree of alignment with internationally recognised benchmarks. The present study responds to this gap by developing a five-step approach that derives its dimensions from a theoretically grounded benchmark, operationalises them through a comparable coding scheme, constructs a synthetic index and integrates gap analysis and robustness checks within a single protocol. This configuration is applied not to firms, projects or territories, but to the institutional architecture of certification standards themselves, thereby making convergence empirically observable as a possible process of institutional alignment shaped by coercive, normative and mimetic pressures.

The study also contributes at the theoretical level by clarifying how legitimacy theory, signalling theory and institutional theory can be used jointly to interpret certification standards as governance instruments in fragmented institutional environments (Connelly et al. 2011; DiMaggio and Powell 1983; Suchman 1995). More specifically, the paper shows how differences in audit structures, institutional endorsement and environmental requirements may be interpreted in terms of external credibility, legitimacy and processes of institutional alignment (Delmas and Montes-Sancho 2010; Gehman et al. 2017; King et al. 2005).

The remainder of the paper is organised as follows. Section 2 reviews sustainability issues in the film industry, presents the theoretical framework adopted in the study, examines the typical evolutionary pattern of sustainability standards and introduces the research hypotheses. Section 3 details the research method. Section 4 presents the findings. Section 5 offers a discussion of the results, and Section 6 concludes the study.

2 | Literature Review, Theoretical Framework and Hypothesis Development

2.1 | Sustainability in the Film Industry

The sustainability implications of film production have received limited but growing attention in academic research, institutional agendas and public discourse. The film industry generates significant emissions through energy use, transport logistics and the temporary nature of film sets, often resulting

in high-impact resource consumption and waste generation (Albert 2020; Maxwell and Miller 2012). Moreover, issues such as resource inefficiency and waste generation are often intensified in large-scale productions (Bozak 2011). These issues underscore the growing need to integrate sustainability principles into the operational models of companies belonging to the film industry. In response, a number of initiatives are emerging to reduce the ecological footprint of film productions, even though the diversity and project-based nature of film production continue to hinder the development of standardised sustainability practices across the industry. Unlike other sectors, the film industry is characterised by nonrepetitive and highly customised production processes. Even when compared to other project-based sectors such as the shipbuilding industry, where procedures tend to remain consistent across different projects, film productions vary significantly from one project to another. For instance, producing ‘Titanic’ involved a completely different set of operations, locations and resource needs than producing ‘Gladiator’. The diversity across film productions makes it difficult to establish standardised sustainability procedures that can be applied consistently. Consequently, the film industry lacks routine workflows, which limits the transferability of best practices and complicates efforts to implement and compare sustainability strategies across the sector.

Several case studies have further exposed the consequences of unsustainable production practices. During the filming of ‘Titanic’, scenes shot in a chlorinated tank in Popotla, Mexico, resulted in severe damage to the marine ecosystem, including the collapse of sea urchin populations and a 33% decline in local fish levels (Maxwell and Miller 2012). Similarly, the production of ‘The Beach’ in Thailand led to ecological degradation due to the bulldozing of native landscapes and the planting of non-native vegetation. The long-term environmental damage, combined with the pressures of overtourism, led to the closure of the beach and, in 2022, a formal financial penalty for the company involved (The Guardian 2022).

In response to such risks, companies in the film industry are increasingly called to adopt structured sustainability strategies. Certification standards serve as accountability tools that translate broad sustainability commitments into specific, measurable and verifiable actions (Elalfy et al. 2021). As indirect accountability mechanisms, these standards enhance transparency and foster stakeholder confidence by ensuring that sustainability practices are both documented and externally assessed. However, the growing relevance of these standards in film production does not in itself resolve the question of how their structural robustness and possible alignment with internationally recognised models can be assessed comparatively.

2.2 | Theoretical Framework

The adoption and evolution of sustainability certification standards in the film industry can be interpreted through the combined lenses of legitimacy theory, signalling theory and institutional theory. Legitimacy theory and signalling theory help explain why organisations adopt certification standards and why some standards are structured in more formalised and credible ways than others, whereas institutional theory helps

explain why fragmented standards may gradually display similar structural features over time.

According to legitimacy theory, firms adopt practices that align with prevailing societal expectations, stakeholder demands and broader norms of appropriate conduct in order to maintain their acceptability within a given institutional environment (Ghobadian et al. 2020; Gulluscio 2023; Suchman 1995). In the context of sustainability certification, this alignment supports the pursuit of what is often referred to as a ‘social license to operate’ (Gehman et al. 2017). This informal approval stems from the perception that the firm acts responsibly within its institutional environment, thereby reinforcing its acceptability and credibility (Gehman et al. 2017; Suchman 1995). In highly visible and reputationally exposed sectors such as film and television production, certification can therefore support legitimacy by demonstrating that the impacts of corporate activities are addressed through formalised procedures, measurable commitments and externally recognisable forms of oversight. From this perspective, standards that incorporate structured audit mechanisms, measurable criteria, documented procedures and stronger forms of institutional endorsement are more likely to be perceived as legitimate because they embody a more formalised response to environmental accountability demands (Gilbert and Rasche 2007; Khan and Khan 2025).

Signalling theory offers a complementary explanation by focusing on how standards communicate otherwise unobservable qualities to external stakeholders. Given the information asymmetries that characterise sustainability performance, third-party certification provides a credible signal of organisational commitment to sustainability principles (Connelly et al. 2011). The strength of the signal, however, depends on its verifiability and the costs associated with producing it. Signals that are costly to produce and difficult to fake carry greater informational content (Connelly et al. 2011). For sustainability certifications, features such as external audits, quantified environmental targets, carbon accounting procedures and formal action plans are likely to strengthen the credibility of a standard because they are more difficult to imitate through purely symbolic adoption and more costly to maintain (Battisti et al. 2025). By contrast, principle-based schemes that rely primarily on internal guidance or self-monitoring may still carry symbolic value, but they generally convey a weaker signal because their claims are less independently verifiable (Delmas and Toffel 2008; King et al. 2005). This signalling logic is particularly relevant in the film industry, where companies operate in a highly visible and reputationally sensitive environment. Here, obtaining a recognised sustainability certification can enhance reputation, attract investors and creative talent and build audience trust, particularly among stakeholders who value environmental responsibility (Connelly et al. 2011; Kääpä and Vaughan 2022a).

To address how different national standards may converge over time, the present study also draws on institutional theory, particularly the concept of isomorphism developed by DiMaggio and Powell (1983). In neo-institutional terms, organisations and standard-setting bodies operating within the same field are exposed to pressures that encourage increasing similarity in structures and practices, even in the absence of formal coordination. DiMaggio and Powell (1983) identify three mechanisms

through which this may occur: coercive, mimetic and normative isomorphism.

Coercive isomorphism arises from formal and informal pressures exerted by powerful organisations, regulators, funding bodies or other actors on which organisations depend, as well as from broader institutional expectations (DiMaggio and Powell 1983). In the context of sustainability certifications, coercive pressures may emerge when broadcasters, public bodies or key industry actors require or strongly incentivise the adoption of more formalised accountability mechanisms. Under such conditions, standards are more likely to incorporate auditable procedures, measurable targets and documented compliance requirements.

Mimetic isomorphism arises under conditions of uncertainty, when organisations or standard-setters model themselves on arrangements that are already perceived as successful, legitimate or effective (DiMaggio and Powell 1983). In fragmented certification environments, this may lead newer or less established standards to borrow visible features from more developed schemes, such as carbon calculators, scoring systems or external verification procedures. This interpretation is consistent with prior research showing that organisations often respond to institutional pressures by aligning with recognised models of responsibility and accountability (Pedersen et al. 2013).

Normative isomorphism, finally, stems from professionalisation and from the diffusion of shared norms through expert communities, industry associations, standard-setting bodies and national certification agencies (DiMaggio and Powell 1983). In this sense, sustainability certification standards can also be understood as coordination mechanisms in fragmented institutional environments, as they provide common procedural expectations, comparable accountability criteria and partially shared governance templates across otherwise heterogeneous national contexts (Delmas and Toffel 2008; King et al. 2005). When sustainability professionals, auditors, consultants and institutional actors circulate common understandings of what a credible certification should include, standards may begin to align even in the absence of direct regulatory harmonisation.

These three mechanisms are not mutually exclusive. In practice, convergence among certification standards may reflect the simultaneous operation of coercive pressures, mimetic processes and normative forces, although their relative strength may vary across standards depending on institutional context, governance structure and development history (DiMaggio and Powell 1983; King et al. 2005).

This integrated framework helps clarify the analytical logic of the study. From a legitimacy perspective, standards operating under stronger institutional pressures or backed by more formal governance arrangements may be expected to display greater structural robustness. From a signalling perspective, standards incorporating external verification and measurable requirements may be expected to provide stronger and more credible signals of sustainability commitment than principle-based initiatives relying mainly on internal monitoring. From an institutional perspective, emerging similarities across standards may be interpreted as early signs of isomorphic alignment, although

such alignment should not automatically be equated with full convergence or international harmonisation. Certification standards thus emerge as mechanisms to operationalise sustainability in film production as well as tools of indirect accountability to address growing stakeholder demands for transparency, credibility and alignment with internationally recognised sustainability principles.

2.3 | The Typical Evolution of Sustainability Certification Standards

The evolution of sustainability certification standards tends to follow a recognisable pattern. In the early stages, fragmented national initiatives emerged independently, often reflecting specific regulatory or institutional contexts. Over time, some of these frameworks are revised to include internationally recognised sustainability principles, gaining broader legitimacy and cross-border relevance. Others fail to adapt to evolving expectations and are gradually abandoned.

This pattern can be observed across different domains. In occupational health and safety, nationally differentiated schemes gradually gave way to a more harmonised international model with the introduction of ISO 45001 (Podrecca et al. 2024). In the social field, SA8000 progressively became a widely recognised reference for labour accountability (Gilbert and Rasche 2007; Orzes et al. 2017; Turzo et al. 2024). Comparable developments can also be observed in environmental and sector-specific settings. The ISO 14000 family became a global benchmark for environmental management by providing structured and internationally comparable procedures (Corbett and Kirsch 2001), whereas the Responsible Care initiative in the chemical industry and ISO 20121 in sustainable event management show how initially fragmented or nationally rooted frameworks may develop into broader reference models through institutionalisation and multistakeholder coordination (Chirieleison and Rizzi 2020; Gamper-Rabindran and Finger 2013).

By comparison, the film industry has not yet consolidated around a globally recognised certification standard. Multiple national initiatives coexist, each characterised by its own structure, scope and verification mechanism. This fragmentation raises the question of whether such standards are evolving toward convergence, either structurally or procedurally, along the lines of the ISO 14000 series, which serves as a reference point for environmental certification standards. Recent research has examined sustainability standards and certification schemes in fragmented institutional environments, highlighting issues of governance, institutional design, compliance, credibility and stakeholder trust (Depoorter and Marx 2024; Marx et al. 2024). Other contributions have drawn attention to the signalling value of certifications, the reputational benefits associated with certification strategies and the tensions between standardisation and innovation in environmental management (Valero-Gil et al. 2023; Valero-Gil et al. 2024). Related research has also shown that weakly credible sustainability signals may generate distrust and reputational risks, especially when external stakeholders perceive a gap between formal claims and substantive practices (Ferrón-Vilchez et al. 2021; Valero-Gil et al. 2025). However,

although these studies have advanced understanding of the governance, compliance, credibility and strategic use of certification schemes, they provide more limited guidance on how to assess, in a structured and replicable way, the degree to which the standards operating within a specific sector differ in structural robustness and display signs of alignment with internationally recognised benchmarks. Recent work has started to address the measurement of robustness and effectiveness in certification schemes and labels, as well as the identification of governance and sustainability indicators for their evaluation (Ares-Sainz et al. 2025; Ladu et al. 2025). However, this research stream remains limited in sector-comparative applications and has not, to our knowledge, been translated into a replicable method for assessing the position of industry-specific certification standards within a broader process of institutional alignment. The present study addresses this gap by proposing a method that can be applied across sectors and repeated over time within the same sector, thereby supporting a more systematic assessment of the structural robustness of certification standards and of their degree of alignment with internationally recognised models.

Against this background, the present study introduces and applies a replicable method to assess the structural robustness of national certification standards within the film industry and their degree of alignment with internationally recognised environmental benchmarks. In line with the theoretical framework developed above, convergence is understood here as a potentially isomorphic process, through which fragmented standards may begin to align under coercive, mimetic and normative pressures, even in the absence of full international harmonisation. Based on this approach, the study formulates and empirically tests the following hypotheses:

Hypothesis 1. *National sustainability certification standards in the film industry exhibit observable and comparable variation in structural robustness, particularly in terms of alignment with internationally recognised environmental certification criteria, such as those defined in the ISO 14000 series.*

Hypothesis 2. *Existing national certification standards show assessable signs of structural and procedural convergence toward a globally recognised environmental sustainability certification model.*

3 | Method

Previous studies have typically relied either on comparative, framework-based assessments of sustainability dimensions or on index-based approaches that translate selected dimensions into aggregate scores and rankings (Bell and Morse 2010; Nardo et al. 2005; OECD et al. 2008). Other contributions have developed structured tools for the assessment of voluntary sustainability standards and their adoption, often through mixed-method and multistep designs tailored to specific analytical purposes (UNCTAD 2020a, 2020b). Research on certification and voluntary environmental arrangements has also highlighted the relevance of issues such as diffusion, credibility, enforcement and governance, particularly in relation to the institutional conditions under which standards acquire legitimacy and practical

effectiveness (Corbett and Kirsch 2001; Delmas and Montes-Sancho 2010). However, these approaches have generally been applied separately or to different units of analysis. The present study builds on these traditions but brings them together into a single five-step analytical configuration that combines comparative mapping, binary index construction, gap identification, threshold-based interpretation and robustness checks in order to assess certification standards as institutional architectures. Applied to the film industry as an illustrative case, this five-step method is used to evaluate the structural robustness of national sustainability certification standards, particularly their alignment with ISO 14000 principles (Hypothesis 1), and to assess their degree of convergence toward a globally recognised model of environmental certification (Hypothesis 2).

As a first step, a set of sustainability standards relevant to the film industry was selected for comparative analysis, based on three criteria: (i) the availability of technical documentation (for instance, operational guidelines, audit protocols or implementation tools) allowing for a structured and replicable assessment of their structural robustness; (ii) institutional endorsement, defined as the formal support of national film bodies, certification authorities or recognised professional associations, ensuring sectoral legitimacy and operational relevance; and (iii) geographic origin, with the scope limited to standards developed in Europe and North America, two regions that have historically shaped the international diffusion of sustainability frameworks across industries (e.g., ISO 14000 series, ISO 45001) (Auld 2014; Labella et al. 2024). This geographic restriction reflects the well-documented tendency for voluntary sustainability standards and certification frameworks to have been designed, institutionalised and internationally diffused primarily by organisations and market actors based in these regions (Auld 2014; Auld et al. 2008; Bartley 2007; Fransen and Kolk 2007; Lambin and Thorlakson 2018; Vogel 2008). A preliminary search for sustainability certification standards in the film and television industries of the Asia-Pacific, Latin American and African regions did not identify frameworks meeting the inclusion criteria of documented technical requirements and institutional endorsement by a recognised national or professional body. This does not exclude the possibility that relevant initiatives exist or may emerge in these regions. The current sample should therefore be understood as capturing some of the most clearly institutionalised certification efforts identified through the present search strategy, within the sectors and regions where such initiatives have become most formalised (Fransen and Kolk 2007; Lambin and Thorlakson 2018), rather than as an exhaustive inventory of all global initiatives.

The second step is represented by the framework-based comparative analysis (FBCA), a comparative method widely used in sustainability research to evaluate the structural alignment of different standards with established frameworks (Corbett and Kirsch 2001). Given that existing sustainability certification standards in the film industry focus primarily on the environmental dimension of sustainability and that none of the five standards examined incorporates structured provisions for social accountability, labour rights or governance, the ISO 14000 series is adopted as the primary reference framework. A benchmark centred on environmental management systems is the most appropriate reference for this analysis and the resulting

FBCA dimensions are therefore calibrated to capture alignment with environmental certification principles. Seven key dimensions have been derived from the ISO 14000 series and from an assessment of the structural requirements that, in light of legitimacy theory and signalling theory, are expected to strengthen the robustness and credibility of certification frameworks. These dimensions are presented in Table 1.

The seven dimensions are conceived as theoretically informed indicators of the institutional robustness and credibility of certification standards. Some dimensions are closely related to both legitimacy and signalling perspectives. This is the case for the audit dimension, which supports the external credibility of the standard through verification procedures, documented audits and other review mechanisms while also reinforcing institutional legitimacy. International applicability is also relevant in this respect, as broader recognition across jurisdictions may strengthen both the legitimacy and the signalling value of a standard. Other dimensions are more closely associated with signalling theory, particularly quantitative CO₂ reduction targets, circular economy and resource efficiency provisions and biodiversity and ecosystem protection, because these elements make environmental commitment more visible, specific and more difficult to imitate symbolically. By contrast, the breadth of the sustainability criteria covered by a standard is more directly linked to legitimacy theory, as it reflects the extent to which the standard responds to a wider set of stakeholder expectations and accountability demands. The mandatory or voluntary character of a standard can also be interpreted through both lenses, albeit in different ways: mandatory adoption reflects stronger institutional pressure and sectoral embedding, whereas voluntary adoption may still carry signalling value when organisations self-select into certification for reputational reasons.

The assessment of each standard against the seven FBCA dimensions was based on official documentary sources, including certification guidelines, publicly available audit protocols,

technical manuals issued by the certifying or endorsing body and, where available, supplementary materials such as carbon calculator specifications and published case reports. A dimension was considered met when the documentation included at least one explicit and verifiable provision addressing it and unmet when no such provision was identified or when the provision was framed as a recommendation without formal requirements. The coding was performed independently by two of the authors. The two sets of assessments were then compared, yielding full agreement across all standard dimension pairs. The coding was subsequently reviewed by a panel of three specialists in media sustainability, who confirmed the assignments without requesting modifications. This two-stage procedure (independent coding followed by expert validation) addresses the concern that binary assessments of qualitative judgements may introduce subjectivity (Nardo et al. 2005).

The third step consists of constructing a dummy variable index (DVI) to systematically assess the degree of structural robustness of each certification standard. Specifically, a set of dummy variables is assigned to each certification analysed, where a value of 1 indicates that the corresponding FBCA dimension is met and 0 otherwise (Wooldridge 2012). This step allows us to translate the qualitative FBCA evaluation into a comparable quantitative score. The total DVI score for each certification is computed as follows:

$$DVI = \sum_{i=1}^N D_i, \quad (1)$$

where D_i represents the dummy variable for each of the seven dimensions i and N is the total number of dimensions. The resulting DVI scores range from 0 to 7, with higher scores indicating more robust sustainability certification frameworks for the film industry.

The fourth step consists of a gap analysis to assess the robustness of each certification standard by identifying critical missing elements that may hinder their credibility, enforceability or

TABLE 1 | FBCA dimensions.

Dimension	Description	Reference standard
Audit	Existence of documented audit or verification mechanisms, including internal audits, external audits, third-party verification or formal compliance review procedures	• ISO 14001 • ISO 14031
Mandatory/voluntary	Whether the certification is legally required or an optional industry initiative	• ISO 14001 • Policy analysis
Scope	Coverage of key areas such as energy efficiency, material use, waste management and carbon footprint	• ISO 14001 • ISO 14004
International applicability	Whether the certification is adopted in multiple countries and recognised beyond national boundaries	• Manual check
CO ₂ targets	Inclusion of measurable and enforceable CO ₂ reduction commitments	• ISO 14064
Circular economy	Implementation of circular economy principles, resource optimisation and waste minimisation	• ISO 14006 • ISO 14031
Biodiversity	Consideration of the certification's impact on ecosystems, land use and biodiversity conservation	• ISO 14055

international comparability (Delmas and Montes-Sancho 2010). Specifically, the analysis focuses on three critical aspects: the absence of key sustainability criteria (Corbett and Kirsch 2001), the lack of enforcement and audit mechanisms (Delmas and Montes-Sancho 2010) and the limited potential for global recognition or interoperability (Hahn and Kühnen 2013). These dimensions are selected as they represent core structural requirements for ensuring the credibility, effectiveness and global applicability of sustainability certification standards (Turzo et al. 2024).

Finally, to enhance the interpretability of the results and allow stakeholders to identify best practices and prioritise areas for policy intervention, the fifth step introduces a threshold-based categorisation, which classifies the analysed certification standards into three levels of structural robustness based on their total DVI scores (Nardo et al. 2005):

$$\left\{ \begin{array}{l} \text{High robustness} - - \text{if } DVI \geq 5, \\ \text{Medium robustness} - - \text{if } 3 \leq DVI \leq 4, \\ \text{Low robustness} - - - \text{if } DVI \leq 2. \end{array} \right. \quad (2)$$

This classification facilitates the comparative assessment required for testing Hypothesis 1 and provides a structured basis for evaluating emerging convergence patterns as outlined in Hypothesis 2.

As noted in the literature on composite indicator construction, the assignment of categorical thresholds to continuous or discrete scores involves a degree of judgement, and the transparency of the rationale and the stability of the resulting classification under alternative specifications are more informative than the cut-points themselves (Nardo et al. 2005). The thresholds adopted in this study follow a rationale based on the distribution of the DVI scale and on substantive considerations about what different score ranges imply for the structural completeness of a certification framework. The DVI ranges from 0 to 7, reflecting seven ISO 14000-derived dimensions. A score of 5 or above indicates that a standard satisfies at least five of the seven dimensions, meaning that it covers the large majority of the structural features associated with a mature environmental management system. A score of 3 or 4 indicates intermediate coverage, with substantial gaps remaining in at least three dimensions. A score of 2 or below indicates that most ISO-derived features are absent, corresponding to standards that offer primarily principle-based guidance without structured certification mechanisms.

Although developed in the context of the film industry, the five-step method is designed for transferability across sectors. Its modular structure allows adaptation along three main dimensions.

First, the benchmark framework can be changed to reflect the sustainability priorities of a different industry. In sectors where social or governance dimensions are more prominent, such as labour-intensive manufacturing or extractive industries, researchers could replace ISO 14000 with ISO 26000, SA8000 or a sector-specific reference framework and derive the FBCA dimensions accordingly.

Second, the number and content of the FBCA dimensions can be adjusted to capture the structural features most relevant to a given sector's certification environment. The seven dimensions used in this study reflect the environmental orientation of film industry standards. In other sectors, dimensions such as supply chain accountability, community engagement or occupational health and safety could be added or substituted.

Third, the threshold cut-points for the DVI categorisation may need to be recalibrated depending on the number of dimensions and the distributional properties of scores in the new context.

Two contextual factors deserve attention when adapting the method. The first is data availability. The FBCA requires access to official documentary sources for each standard, including certification guidelines, audit protocols and assessment criteria. In sectors or regions where such documentation is less formalised or less publicly accessible, the coding process may require supplementary data collection, for example, through interviews with standard-setting bodies. The second factor is the regulatory environment. In industries subject to more stringent public regulation, the distinction between mandatory and voluntary standards may take different forms, and the role of coercive isomorphism in shaping certification structures may be correspondingly stronger.

Figure 1 provides a schematic overview of the five analytical steps described in this section.

4 | Findings

4.1 | Identification of Sustainability Certification Standards

In line with the methodological criteria outlined above, a set of sustainability standards applicable to the film industry was identified and retained for analysis. The standards selected meet the inclusion criteria in terms of technical documentation, institutional endorsement and geographic relevance (see Table A1 in Appendix A for a summary of the selected standards and countries of origin).

4.1.1 | Albert Certification

The Albert Certification is a sustainability standard launched in 2011 to reduce the environmental impact of film and television production in the United Kingdom. It was developed by BAFTA in collaboration with the British Film Institute (BFI) and Arup. Initially introduced as a carbon calculator for broadcasters, it later evolved into the broader Albert Initiative, which also includes technical tools and training programmes for the screen industries. BAFTA also created the Albert Consortium, which brings together major broadcasters and production companies such as the BBC, ITV, Channel 4, Sky and Netflix UK, thereby supporting the wider diffusion and use of Albert's tools (Albert 2020).

Albert certification is mandatory for all new and recommissioned TV broadcast content produced for the BBC, whereas other UK

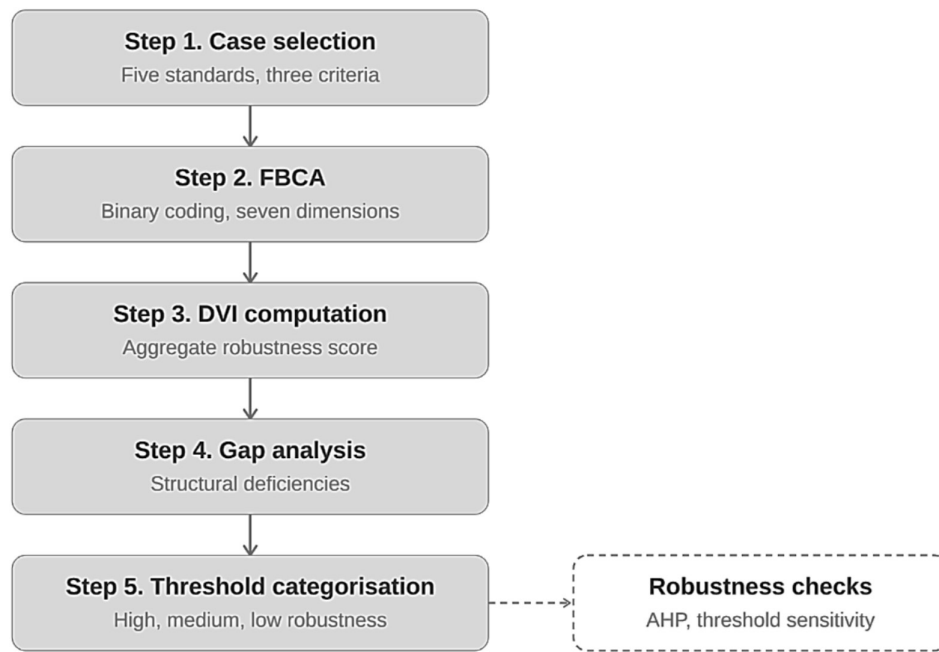


FIGURE 1 | Overview of the five-step analytical method. *Source:* Authors' own elaboration.

broadcasters often require carbon footprint reporting even where full certification is not compulsory. The certification process is based on three pillars: completion of a carbon footprint, development of a carbon action plan and offsetting of residual emissions (Kääpä and Vaughan 2022a). Productions are required to enter data on travel, accommodation, energy use, staffing and post-production activities into the Albert carbon calculator during pre-production. The resulting footprint is reviewed internally and then submitted to an external auditor for verification.

The action plan must identify measures to reduce emissions and be finalised before filming begins, whereas residual emissions must be offset through certified environmental projects. Albert certification therefore relies on regular external audits to verify the accuracy and completeness of submitted data, including the carbon footprint and action plan. When the requirements are met, productions receive certification and may display the Albert logo on their end-board as evidence of their sustainability commitment (Albert 2020; Kääpä and Vaughan 2022b).

4.1.2 | EcoProd Initiative

EcoProd is the leading initiative promoting sustainable film and television production in France. Founded in 2009 as a non-profit association, it was established by key industry actors including Audiens, CST, Film Paris Region and major broadcasters such as Canal+, France Télévisions and TF1 (EcoProd 2024). Its main objective is to reduce the environmental footprint of audiovisual productions. EcoProd brings together a broad network of stakeholders, including production companies, broadcasters, service providers, unions, film schools and public institutions and acts as a platform for the diffusion of sustainable practices. It also provides tools such as the Carbon'Clap carbon calculator, production guides and training programmes for professionals and students (Ruiz Guzmán 2022).

In 2022, EcoProd launched the EcoProd Label, a voluntary certification developed in partnership with AFNOR Certification, the French national standardisation body. AFNOR is responsible for auditing productions and verifying compliance with the certification criteria before issuing the label. The certification applies to films, advertisements and television programmes. To qualify, a production must achieve a score of at least 65% across a framework of 80 sustainability actions, including eight mandatory criteria: carbon footprint calculation, energy efficiency, waste management, sustainable transportation, eco-friendly materials, water conservation, biodiversity protection and green communication.

At the core of the process is Carbon'Clap, which is used to quantify emissions and identify their main sources. Producers must also submit an action plan before filming begins, outlining measures to reduce emissions and improve sustainability performance. During production, supporting documentation is collected and shared with the certifying body. AFNOR conducts audits through site visits, virtual assessments or document reviews and may also interview production staff. Productions that satisfy the criteria receive the EcoProd Label and may display the logo in their end credits. The certification framework is subject to ongoing revision through collaboration with institutions such as ADEME, the French ecological transition agency and IRCAV, a leading media research institute focused on sustainability and innovation (EcoProd 2024).

4.1.3 | Green Film Rating System

The Green Film Rating System is a voluntary certification initiative aimed at promoting environmental responsibility in the Italian film industry. Established in 2019 by the Trentino Film Commission in collaboration with environmental consultants and film professionals, it responds to growing awareness of the environmental impacts of audiovisual production and to the need for more standardised mitigation strategies (D'Urso 2022).

The system applies to individual film and television projects and is based on a structured certification process. Producers are required to review the official guidelines and complete a checklist of applicable measures, including energy saving, transport and accommodation optimisation, eco-friendly catering, sustainable material use, waste management and communication of sustainability commitments (Green Film 2022).

Compliance with the selected criteria must be maintained throughout production and is assessed by an independent verifying body, either a certified environmental auditor or a public entity, through documentation review and on-site inspections.

Before filming begins, producers must submit a Sustainability Plan that identifies the selected criteria and the actions planned to ensure compliance. The plan must also include the nomination and curriculum vitae of a Green Film Manager with at least 2 years of experience in environmental consulting. During production, verification is based on documentary evidence and on-set observation. A specific focus is placed on transport optimisation, for which a designated mobility manager must prepare and monitor a transport optimisation plan.

Certification is awarded through a scoring system. Each criterion is assigned a number of points, and productions must reach a minimum of 20 points, provided all mandatory prerequisites are met. EMAS-registered productions benefit from a reduced score threshold. The standard also encourages continuous improvement by inviting certified productions to maintain and strengthen their sustainability performance in future projects (Green Film 2022).

4.1.4 | Producers Guild of America (PGA) Green Initiative

The PGA promotes sustainable filmmaking through the Green Production Guide, a principle-based standard introduced in 2014 in collaboration with Green Media Solutions LLC and Earth Angel Sustainable Production Services (Kääpä and Vaughan 2022a; Victory 2015). Designed for independent producers and production teams, the guide offers strategies to reduce carbon emissions and integrate sustainability throughout all phases of film and television production.

Rather than offering formal certification, the guide sets out best practices across departments such as production office, location management, transportation, set design, catering, lighting, wardrobe and post-production (Green Media Solutions and Earth Angel Sustainable Production Services 2014). Its purpose is to reduce resource consumption, pollution and waste while encouraging environmentally informed decision-making.

The process begins in pre-production, when producers are encouraged to set sustainability goals, appoint an Eco Supervisor and communicate targets to the full crew. The Eco Supervisor coordinates sustainability efforts throughout the production cycle. A central tool within the framework is the PGA carbon calculator, which is used to quantify emissions from travel, energy and waste and to inform a sustainability plan.

Although the guide is not tied to a formal certification scheme, it recommends internal monitoring and third-party audits by accredited professionals, including site visits and document reviews to verify reported data and the adoption of green practices. It also promotes interventions such as energy-efficient lighting, renewable energy use, sustainable set construction and responsible catering practices. The Green Production Guide thus functions as a sustainability reference in the North American screen industries despite the absence of formal certification.

4.1.5 | Ontario Green Screen Initiative

The Ontario Green Screen Initiative is a Canadian certification launched in 2020 by Ontario Creates in collaboration with industry stakeholders to support the integration of sustainability into the province's screen sector. Ontario Creates is a governmental agency that supports development across creative industries, including film, television, music, publishing and digital media.

The initiative aims to reduce the environmental footprint of film and television productions through training and practical resources for industry professionals. Its principle-based approach promotes the voluntary adoption of sustainability practices across all stages of production. Training is a central component of the initiative, with a focus on climate literacy and sustainable production practices.

One of its main tools is the Ontario Production Guide, a directory of services and suppliers supporting film and television production in the region, including labour, equipment, accommodation, transportation and post-production services (Ontario Creates 2020). The initiative also encourages producers to develop sustainability plans aimed at reducing waste, lowering energy consumption and adopting sustainable materials and processes. Although certification is not mandatory, the framework promotes structured planning and documentation of sustainability efforts in order to enhance transparency and accountability.

Productions are encouraged to monitor progress and share results with stakeholders. The initiative also promotes regular audits and internal reviews to assess the implementation of sustainability measures while allowing for external audits as an additional, although nonmandatory, form of assurance. Through education, planning and monitoring, the Ontario Green Screen Initiative supports the adoption of more sustainable practices in the screen industry.

4.1.6 | Comparative Overview of the Selected Standards

Table 2 presents a comparative synthesis of the five selected sustainability certification standards in the film industry.

4.2 | Framework-Based Comparative Analysis

The FBCA of the selected standards, based on seven evaluation dimensions, reveals relevant differences in structure, enforceability and scope. The results are summarised in Table 3, which

TABLE 2 | Comparative analysis of sustainability standards in the film industry.

Standard					
Standard feature	Albert Certification	EcoProd Initiative	Green Film Rating System	PGA Green Initiative	Ontario Green Screen Initiative
Issuance year	2011	2009	2019	2014	2020
Standard nature	Certification-based standard	Certification-based standard	Certification-based standard	Principle-based standard	Principle-based standard
Scope	Film and TV broadcast content	Film and TV productions	Film and TV productions	Film and TV productions	Film and TV productions
Primary geographic scope	UK	France	Italy	USA	Ontario province
Mandatory/voluntary	Mandatory for TV content	Voluntary	Voluntary	Voluntary	Voluntary
Key requirements	• Carbon footprint • Action plan • Offsetting	• Carbon footprint • Action plan • Mandatory criteria	• Energy-saving transport • Catering • Materials • Waste • Communication	• Energy-saving • Set design • Catering	• Sustainability plan • Waste • Energy • Materials
Audit	External audits	External audits by AFNOR Certification organisation	Document verification and on-set inspections	Internal and external audits	Internal and external audits
Auditor	External Auditors	AFNOR Certification organisation	Trentino Film Commission	Accredited Auditors	External Auditors

Source: Authors' own elaboration.

TABLE 3 | Alignment of sustainability standards with FBCA dimensions.

Standard	Audit	Mandatory/ voluntary	Scope	International applicability	CO ₂ targets	Circular economy	Biodiversity
Albert Certification	1	1	1	1	1	1	0
EcoProd Initiative	1	0	1	0	1	1	1
Green Film Rating	1	0	1	0	0	1	0
PGA Green Initiative	1	0	1	0	0	0	0
Ontario Green Screen	1	0	1	0	0	0	0

Note: A value of 1 indicates that the standard's official documentation includes at least one explicit, verifiable provision addressing the corresponding dimension; a value of 0 indicates that no such provision was identified. The operational criteria applied to each dimension are as follows. For 'Audit', a score of 1 required documented use of audit, review or verification mechanisms, including internal audits, external audits, third-party verification or other formal compliance procedures. For 'Mandatory/voluntary', a score of 1 was assigned when adoption is required by a regulatory or institutional mandate for at least one category of production. 'Scope' received a score of 1 when the documentation covered at least three of the following areas, namely, energy, transport, waste, materials and carbon footprint. For 'International applicability', a score of 1 required evidence of formal adoption or recognition beyond the standard's country of origin. 'CO₂ targets' received a score of 1 when the standard included a documented, measurable emission reduction requirement. For 'Circular economy', a score of 1 required documented provisions for resource optimisation or waste minimisation that go beyond general waste management. For 'Biodiversity', a score of 1 required at least one explicit provision addressing ecosystem impact, land use or biodiversity conservation.

highlights the alignment of each selected standard with the comparative dimensions and in Figure 2, which visually illustrates the dimensional coverage of the five standards.

The analysis reveals significant variation in how the selected standards align with the seven evaluation dimensions derived from the ISO 14000 series.

Albert certification and EcoProd initiative achieve the highest levels of integration, satisfying six and five dimensions, respectively. Both include external audits, structured environmental criteria and mechanisms for carbon footprint management. Albert certification stands out as the only mandatory standard, requiring certified carbon calculation, reduction and offsetting for new broadcast content. EcoProd, although voluntary, is supported by a national certification body and enforces carbon footprint assessments and reduction planning.

Green Film Rating satisfies three dimensions, combining audit procedures with formal sustainability criteria, but lacks enforceable emissions targets, biodiversity targets and international applicability.

PGA Green initiative and Ontario Green Screen meet only two dimensions. These principle-based standards prioritise voluntary implementation and rely mainly on internal monitoring while also encouraging or allowing audit and review arrangements, although structured third-party verification and quantified targets are not central requirements of the standard.

Most standards address common environmental areas such as energy, transport, waste and materials. However, circular economy principles are only partially integrated and biodiversity is explicitly considered in EcoProd only.

4.3 | DVI

To quantify the overall robustness of each sustainability standard, a DVI was computed by aggregating the binary scores assigned in the FBCA.

Each of the seven evaluation dimensions was assigned a value of 1 when met and 0 otherwise, as detailed in Table 3. The DVI thus ranges from 0 to 7, reflecting the number of dimensions satisfied by each standard (see Table 4 and Figure 3).

The results indicate clear stratification among the five standards. Albert attains the highest score, satisfying six out of seven dimensions. EcoProd follows with a score of five, whereas Green Film Rating achieves a moderate score of three. Both PGA Green and Ontario Green Screen show limited alignment, meeting only two dimensions each.

4.4 | Gap Analysis

To complement the FBCA and DVI results, a gap analysis was conducted to identify critical shortcomings in the existing certification standards. The analysis focuses on three aspects: (i) the absence of key sustainability criteria, (ii) the lack of enforcement mechanisms and (iii) barriers to international recognition. According to the existing literature, these aspects allow adopters to ensure the credibility, effectiveness and transnational applicability of sustainability frameworks (Delmas and Montes-Sancho 2010; Hahn and Kühnen 2013).

Table 5 presents the results of the gap analysis, highlighting for each standard the presence or absence of these three structural components.

First, the analysis indicates that existing certification standards tend to emphasise the environmental dimension of sustainability, with limited incorporation of social and governance dimensions. None of the examined standards currently includes structured provisions related to fair labour practices, diversity and inclusion, ethical governance or community engagement. Although this focus reflects the operational priorities and origins of many of these standards, it also results in a partial alignment with broader sustainability frameworks such as the UN SDGs or ISO 26000. Over time, as expectations around comprehensive accountability grow, these standards may evolve to more explicitly integrate social and governance criteria. In some

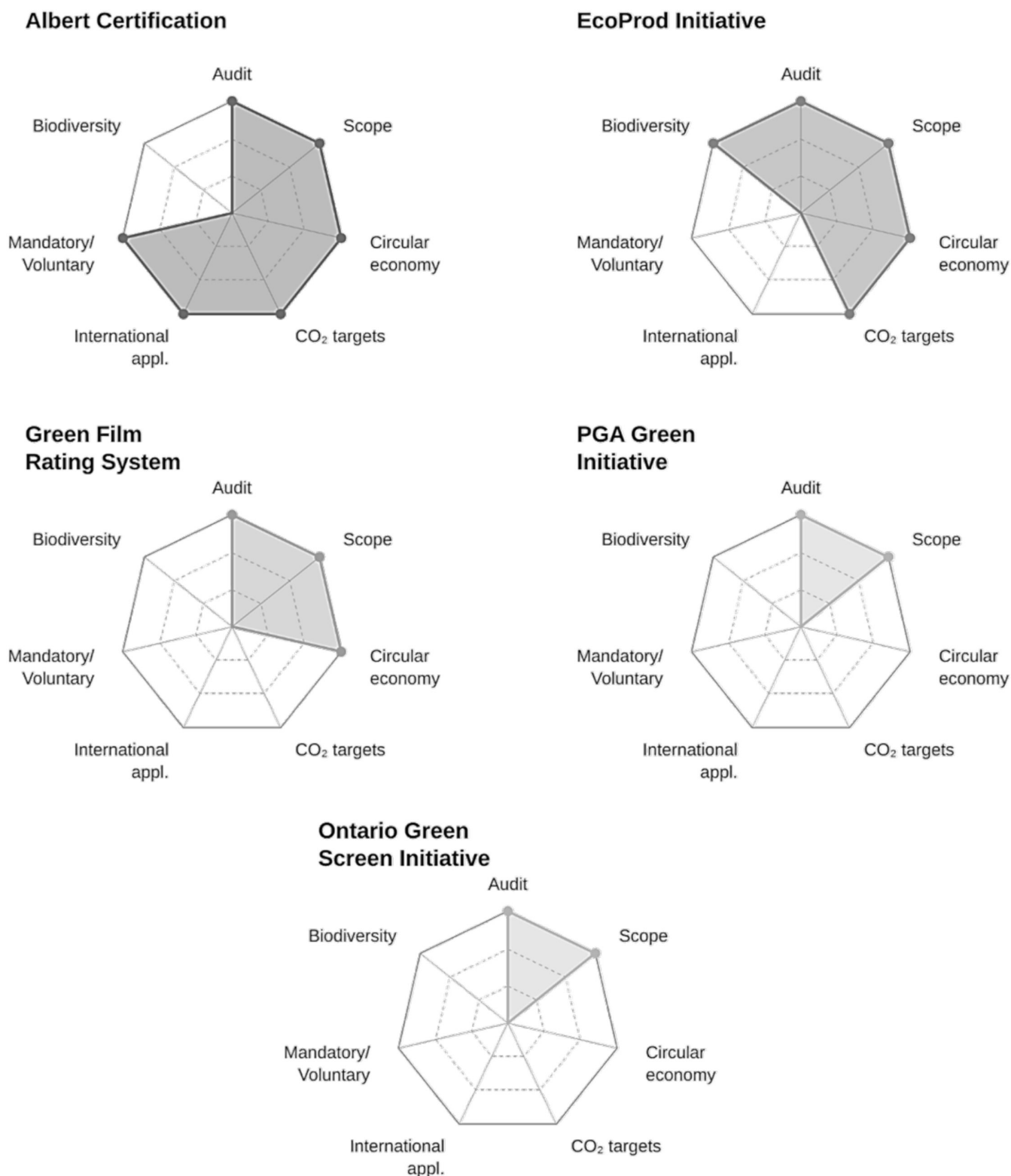


FIGURE 2 | Radar plots of dimensional coverage across the five standards. *Source:* Authors' own elaboration.

cases, even the environmental focus remains incomplete. For instance, the Albert certification does not address biodiversity, whereas the Green Film Rating lacks quantified CO₂ reduction targets.

Second, enforcement mechanisms vary considerably. Albert certification, EcoProd initiative and Green Film rating integrate

structured audit procedures, including third-party verification and on-set inspections, which support transparency and accountability. PGA Green Initiative and Ontario Green Screen rely mainly on internal monitoring and non-mandatory audit or review arrangements. The absence of structured external verification weakens the credibility of these standards, especially in contexts where formal certification is not mandatory.

Third, none of the analysed standards demonstrates formal international recognition. Some of them, such as Green Film and Ontario Green Screen, originated as regional initiatives and later expanded to acquire national relevance within their respective countries. Others, like the Albert certification and the EcoProd initiative, were designed as national frameworks from the beginning. The PGA Green Initiative, although national in scope, remains embedded in a principle-based framework and does not

offer a formal certification process. Despite their different levels of institutionalisation, all five frameworks remain embedded in domestic regulatory and operational systems. This national or subnational anchoring limits the comparability and scalability of sustainability efforts across jurisdictions. As a result, they lack formal interoperability, and none of them is recognised as an international standard.

TABLE 4 | DVI scores.

Standard	DVI score
Albert Certification	6
EcoProd Initiative	5
Green Film Rating System	3
PGA Green Initiative	2
Ontario Green Screen Initiative	2

4.5 | Threshold-Based Categorisation

To support interpretation of the DVI scores and facilitate the identification of best practices, the five standards were grouped into three robustness levels, following a threshold-based categorisation (Nardo et al. 2005).

The results, shown in Table 6, indicate that only Albert Certification and EcoProd Initiative fall within the high robustness category. Both standards align with at least five of the seven FBCA dimensions. Both of their frameworks exhibit a relatively

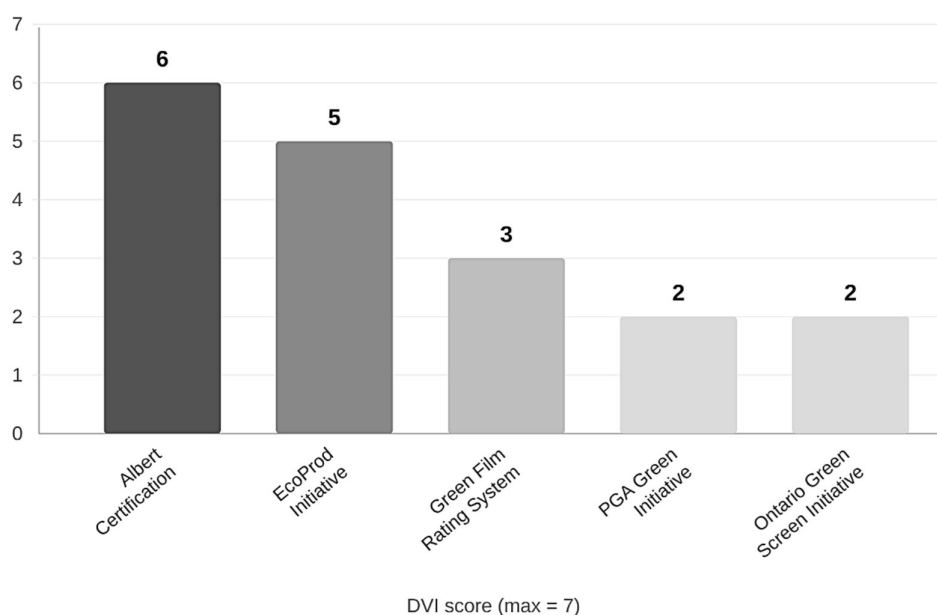


FIGURE 3 | DVI scores. *Source:* Authors' own elaboration.

TABLE 5 | Gap analysis.

Standard	Lack of sustainability criteria	Lack of enforcement mechanisms	Barriers to international recognition
Albert Certification	Yes	No	Yes
EcoProd Initiative	Yes	No	Yes
Green Film Rating	Yes	No	Yes
PGA Green Initiative	Yes	Yes	Yes
Ontario Green Screen	Yes	Yes	Yes

Note: 'Lack of sustainability criteria' is recorded as 'Yes' when the standard does not address at least one of the following, namely, social accountability, governance, biodiversity or quantified emissions targets. 'Lack of enforcement mechanisms' is recorded as 'Yes' when the standard does not require mandatory external audits or third-party verification as a condition of certification. 'Barriers to international recognition' is recorded as 'Yes' when no formal provisions exist for cross-national recognition, mutual certification or equivalence with international frameworks. All five standards share the same gap profile with respect to sustainability criteria and international recognition. Enforcement mechanisms are more structured in the three certification-based standards (Albert, EcoProd and Green Film), whereas the two principle-based standards (PGA Green and Ontario Green Screen) rely mainly on internal monitoring and nonmandatory review arrangements rather than on mandatory external verification.

TABLE 6 | Threshold-based categorisation.

Robustness level	Standard(s)	DVI score
High (DVI ≥ 5)	Albert Certification and EcoProd Initiative	6 and 5
Medium (3 $\leq$ DVI ≤ 4)	Green Film Rating System	3
Low (DVI ≤ 2)	PGA Green Initiative and Ontario Green Screen	2 and 2

high degree of procedural and operational maturity, despite limitations in international applicability.

The Green Film Rating System is positioned in the medium robustness category, with a DVI score of 3. Although it integrates verification procedures and clearly defined environmental requirements, it lacks enforceable CO₂ targets, biodiversity indicators and broader alignment with international standards.

Both the PGA Green Initiative and the Ontario Green Screen fall into the low robustness category. Their principle-based structures, absence of mandatory audits and limited scope of application result in lower alignment with the FBCA dimensions. These initiatives provide useful guidance but do not currently meet the threshold for structured certification frameworks.

4.6 | Robustness and Sensitivity Checks

Two checks are conducted to assess whether the substantive conclusions of the analysis are sensitive to specific methodological assumptions, namely, the weighting scheme applied to the FBCA dimensions and the threshold cut-points used in the categorisation.

A weighted index approach is employed as a first robustness check to validate the results of the DVI ranking. Composite indicators often rely on equal weighting, which assumes that all criteria contribute equally to the final score (Nardo et al. 2005). However, sustainability assessments often require differentiated weights to reflect the varying importance of different criteria (Saaty 1980).

In this study, two weighting schemes are applied. The first assumes equal weights (baseline DVI score), where each dimension receives a weight of 0.14 (i.e., the result of 1/7, where 7 is the maximum number of FBCA dimensions). Under this assumption, the minimum possible score is 0 (when none of the criteria are met), and the maximum is 0.98 (i.e., 0.14 $\times$ 7), corresponding to full alignment with all FBCA dimensions. The second applies the analytic hierarchy process (AHP), a multicriteria decision-making technique that derives differentiated weights through pairwise comparisons of criteria (Saaty 1980). AHP has been used in prior sustainability research to weight dimensions in composite indicators and to assess the relative salience of certification criteria (Chin et al. 1999; Nardo et al. 2005). In this study, pairwise comparisons among the seven FBCA dimensions were

TABLE 7 | Weighted indexes.

Standard	Equal-weighted DVI	AHP-weighted DVI
Albert Certification	0.84	0.92
EcoProd Initiative	0.70	0.81
Green Film Rating	0.42	0.45
PGA Green Initiative	0.28	0.40
Ontario Green Screen	0.28	0.40

conducted by the research team, drawing on the relative weight that each dimension carries within the ISO 14000 framework and on the sustainability certification literature. The comparisons followed the standard Saaty (1980) nine-point semantic scale, in which a value of 1 indicates equal weight between two dimensions and a value of 9 indicates that one dimension is strongly prioritised over the other. The full pairwise comparison matrix, the normalised weight vector and the consistency check are presented in Appendix B. The consistency ratio falls below the conventional 0.10 threshold (Saaty 1980), confirming the internal coherence of the pairwise judgements. The weighted DVI score is computed as follows:

$$DVI_{\text{weighted}} = \sum_{i=1}^N w_i D_i, \quad (3)$$

where w_i represents the weight assigned to each dimension.

Table 7 presents equal-weighted and AHP-weighted DVI scores for each standard.

The results show that the comparative position of the standards across the different DVI scores remains unchanged across the two weighting methods, indicating that the evaluation is not overly sensitive to the choice of weighting assumptions. This consistency reinforces the reliability of the findings and confirms the robustness of the classification developed through the FBCA and DVI framework.

As a second check, the stability of the threshold-based categorisation was assessed by shifting the threshold boundaries by one point in each direction. Under a more restrictive scheme (high ≥ 6 , medium 4–5 and low ≤ 3), Albert remains the only standard classified as high robustness, whereas EcoProd shifts to the medium category alongside Green Film. Under a more inclusive scheme (high ≥ 4 , medium 2–3 and low ≤ 1), EcoProd and Green Film both enter the high category, whereas PGA Green and Ontario Green Screen shift to medium. In both alternative configurations, the ordinal ranking of the five standards remains unchanged, and the two principle-based standards (PGA Green and Ontario Green Screen) remain in the lowest category. The substantive conclusions of the analysis, namely, the stratification of standards into more and less robust groups and the gap between certification-based and principle-based frameworks, are therefore stable across the threshold specifications tested.

Taken together, the two checks confirm that neither the weighting assumptions nor the categorisation cut-points drive the

substantive findings. The ordinal ranking and the broad stratification of standards are preserved under all specifications tested.

5 | Discussion and Implications

5.1 | Discussion

The comparative analysis highlights a fragmented but differentiated certification landscape in the film industry, with clear variation in structural robustness and only limited signs of alignment with internationally recognised models. These findings help answer the research questions of this study concerning both the degree of structural robustness across existing standards and the extent to which the field shows signs of convergence toward a more coordinated certification model.

The FBCA and DVI results provide clear support for Hypothesis 1. The five standards present observable and measurable variation in structural robustness, with DVI scores ranging from 2 (PGA Green and Ontario Green Screen) to 6 (Albert). The threshold-based categorisation identifies two standards in the high-robustness category (Albert, DVI=6; EcoProd, DVI=5), one in the medium category (Green Film, DVI=3) and two in the low category (PGA Green and Ontario Green Screen, DVI=2 each). This stratification is confirmed by the AHP-weighted scores, which preserve the same ranking, indicating that the evaluation is not sensitive to the choice of weighting assumptions.

The results can be interpreted coherently through the legitimacy, signalling and institutional theories. Through the lens of legitimacy theory, the fact that Albert is the only standard operating under a mandatory adoption regime and also has the highest score suggests that stronger institutional pressure is associated with greater structural robustness. From a signalling theory perspective, certification-based standards with external verification consistently outperform principle-based standards relying on internal monitoring, which is consistent with the interpretation that independently verifiable procedures strengthen the credibility of sustainability claims. The results indicate that mechanisms typical of legitimacy and signalling theories operate jointly, although with different intensity across standards. Albert, which combines mandatory adoption with the most formalised verification structure, scores highest. EcoProd, voluntary but supported by a national standardisation agency and incorporating external audits, scores second. The two principle-based standards, which lack both regulatory backing and structured external verification, score lowest. This gradient suggests that legitimacy- and signalling-related mechanisms reinforce one another in shaping the structural robustness of certification frameworks.

From the perspective of institutional theory, the evidence for isomorphic dynamics is more nuanced. EcoProd, developed with the involvement of the French national standardisation agency AFNOR, achieves the second-highest DVI score, which is consistent with a normative-isomorphism interpretation. The involvement of professional standard-setting bodies may increase the likelihood of structural alignment with internationally recognised benchmarks. The strong institutional pressures operating on Albert, channelled through the

BBC mandate, are similarly consistent with coercive isomorphism. By contrast, the two most recently established standards do not exhibit the highest alignment with ISO 14000 principles, which makes a straightforward mimetic interpretation less convincing in this case. The more recent introduction of a standard, on its own, does not appear to account for closer alignment with ISO-based structural features. The evidence therefore appears more consistent with coercive and normative pressures than with mimetic ones, although the cross-sectional design does not permit strong claims about the relative influence of each mechanism.

Regarding Hypothesis 2, Albert and EcoProd present substantial alignment with ISO 14000 principles, particularly in terms of auditability, measurable criteria and carbon accounting systems. However, this alignment is more accurately described as partial and selective alignment with ISO-based structural features, consistent with early harmonisation pressures, rather than full-scale convergence toward a globally recognised model. In other words, the current evidence points more clearly to selective alignment than to convergence in the stronger sense of cross-national consolidation around a shared standard. At present, the evidence is sufficient to identify such alignment in a limited number of cases, but not to infer a generalised convergence trend across the field.

Several features distinguish the current landscape from the mature convergence phases observed in other industries. None of the five standards demonstrates formal international interoperability or cross-national recognition. Even the most structurally developed frameworks remain embedded in domestic regulatory and operational systems. The national anchoring limits the comparability and scalability of sustainability efforts across jurisdictions, and none of the standards is currently recognised as an international standard. As the Responsible Care initiative in the chemical industry and ISO 20121 in event management illustrate, the transition from fragmented national standards to globally consolidated benchmarks typically unfolds over decades of institutional coordination (Chirieleison and Rizzi 2020; Gamper-Rabindran and Finger 2013). The film industry has not yet entered this mature phase. Stronger evidence of convergence would require longitudinal observation of whether additional standards progressively incorporate similar audit, target-setting and verification features over time, whether new standards entering the field adopt structural features from the highest scoring existing frameworks and whether cross-national coordination mechanisms (e.g., mutual recognition agreements, joint development initiatives) emerge among standard-setting bodies.

Finally, all five standards are centred on environmental performance, with no structured provisions for social or governance criteria. Even within the environmental domain, coverage is uneven: Albert does not address biodiversity, whereas Green Film lacks quantified CO₂ reduction targets.

5.2 | Theoretical Implications

The findings carry several implications for how legitimacy theory, signalling theory and institutional isomorphism apply

to the governance of sustainability certification standards in project-based industries, such as the film industry.

The differences across standards can be interpreted in light of two partially overlapping dimensions, namely, the extent to which a standard is institutionally embedded and the degree to which its sustainability claims are externally credible. Thus, the conditions under which certification standards most effectively support both legitimacy and signalling functions are those that combine formal institutional endorsement with independently verifiable accountability procedures. Where both conditions are present, as in Albert, the standard achieves the highest robustness score. Where only one of these conditions is clearly present, robustness is intermediate. EcoProd benefits from normative backing through AFNOR but is not mandatory, whereas Green Film offers formal certification but with a more limited scope. Where neither condition is met, as in PGA Green and Ontario Green Screen, robustness is low. This two-condition interpretation provides a parsimonious way of reading the observed DVI gradient.

The weaker performance of principle-based standards can be traced to a specific set of structural features rather than to a single deficiency. PGA Green and Ontario Green Screen lack structured external verification, quantifiable environmental targets and formal certification outcomes. Each of these absences weakens the signalling function in a distinct way. Without external audits, claims of sustainability commitment cannot be independently validated. Without quantified targets, the standard conveys no measurable benchmark against which performance can be assessed. Without a formal certification outcome, the standard does not produce a discrete and recognisable credential that stakeholders can use to differentiate certified from uncertified producers. The combination of these three features in a single framework substantially reduces the informational content of the sustainability signal and, by extension, the legitimacy benefits that adoption can confer. This finding refines the signalling-based interpretation of certification design by suggesting that signal credibility depends on the joint presence of multiple reinforcing mechanisms rather than on any single design feature alone (Connelly et al. 2011).

The institutional isomorphism framework proves useful for interpreting differences across standards, although the cross-sectional design limits the strength of causal inferences. The findings do not support the view that all standards are shaped by the same isomorphic logic. Different mechanisms appear to be more relevant in different cases. Coercive isomorphism appears strongest where a powerful institutional actor mandates adoption and specifies structural requirements. Normative isomorphism appears to operate where professional standard-setting bodies are directly involved in standard development, embedding internationally recognised practices into the framework design. Mimetic isomorphism, by contrast, appears weaker in this context. One possible explanation is that mimetic processes require not only the visibility of a reference model but also institutional intermediaries (consultants, professional networks and industry associations) able to diffuse structural templates and that such intermediaries may not yet be sufficiently developed in the film industry's sustainability governance landscape.

In theoretical terms, convergence does not emerge automatically from the coexistence of multiple standards, but from the gradual accumulation of coercive pressures, normative templates and, more selectively, mimetic borrowing across the field. More broadly, the analysis illustrates how isomorphic alignment in fragmented and emerging certification fields may be uneven and mechanism-dependent. Whether the selective alignment documented here will develop further over time into a more consolidated convergence pattern, comparable to that observed in the chemical or event-management sectors, remains an open question. Addressing it would require longitudinal evidence on revisions to existing standards and on the possible emergence of cross-national coordination mechanisms, offering a clear avenue for future research.

5.3 | Practical Implications

The findings provide concrete guidance for film production companies and sustainability managers making decisions about certification adoption. In practical terms, organisations seeking stronger external credibility, greater comparability and more robust accountability should prioritise standards that combine carbon accounting, external audits and structured sustainability plans. These features strengthen the reliability of sustainability claims and make certification more meaningful for broadcasters, investors, public agencies and other external stakeholders. Where such standards are available and applicable, their adoption can offer clearer benefits in terms of stakeholder trust, reputational assurance and preparedness for possible future harmonisation processes.

Adopting a more structured certification standard, however, involves trade-offs that vary with organisational size and capacity. The inclusion of mandatory audits, CO₂ emission targets and documented compliance procedures entails higher compliance costs in terms of data collection, reporting and verification fees (Kääpä and Vaughan 2022a). For larger production companies and studios with dedicated sustainability teams, these costs are typically manageable and generate returns through enhanced stakeholder confidence and regulatory preparedness. For smaller and independent producers, the balance between costs and benefits is less straightforward. In such cases, a staged approach may be advisable. Companies can begin with a principle-based standard as an entry point for building internal sustainability awareness and capacity, with the aim of transitioning to a certification-based standard as organisational readiness increases. The principle-based standards, although weaker in signalling power, still provide a structured starting point for integrating sustainability considerations into production workflows (Shooshtarian et al. 2024).

For practitioners operating in regions or national contexts where no robust standard currently exists, two options can be considered. The first is to adopt and adapt an existing, more robust certification standard from another jurisdiction, using its framework as a voluntary benchmark even in the absence of local institutional support. The second is to engage with local industry associations and film commissions to advocate for the development of a nationally endorsed standard that draws on the structural features that are associated with stronger certification

frameworks, namely, external audits, measurable targets, carbon accounting and formal certification outcomes.

5.4 | Policy and Standard Setter Implications

For standard setters and policymakers, the findings raise a strategic question concerning the most effective route towards international harmonisation. In policy terms, two broad pathways can be identified.

The first pathway would build on one or two existing, more structurally developed standards as reference points for broader international development. Within the current sample, Albert and EcoProd emerge as the most developed reference points, given their institutional backing, procedural maturity and partial alignment with ISO 14000 principles. This pathway would require negotiation among national standard-setting bodies, expansion of the geographic scope and applicability of the chosen standard or standards and formal endorsement by an international standard-setting or multistakeholder body. Its main advantage is that it builds on existing institutional infrastructure and demonstrated operational feasibility. Its main limitation is that national standards carry design features shaped by domestic regulatory and cultural contexts, which may require adaptation for international use.

The second pathway involves developing a new, purpose-built international standard for the film industry, drawing on the development process that led to ISO 20121 for sustainable event management. ISO 20121 was developed through a multistakeholder process that began with a national standard in the United Kingdom, expanded through international consultation and was formally adopted as an ISO standard in 2012 (Chirieleison and Rizzi 2020). A comparable development process for the film industry would require the identification of a reference framework, ideally drawing on the structural features shared by the most developed standards identified in this study, the creation of an international working group involving standard-setting bodies, film commissions and environmental agencies and the development of a standard capable of balancing environmental rigour with operational feasibility across different national production contexts. This pathway is more resource-intensive, but it offers the advantage of producing a framework that is internationally legitimate from inception.

Regardless of the pathway chosen, two issues require policy attention. The first is the absence of social and governance criteria across the standards examined. The current certification landscape in the film industry remains focused almost exclusively on environmental performance, with no structured provisions for fair labour practices, diversity, community impact or ethical governance. As stakeholder expectations around accountability evolve, future iterations of film-industry certification standards may increasingly need to incorporate such provisions, either by broadening existing environmental frameworks or by supplementing them with ESG-specific modules. This would move film-industry standards closer to the broader scope of sustainability frameworks such as ISO 26000 or the

UN SDGs. The second concerns the current lack of formal interoperability mechanisms. Even among the most robust standards, no provisions currently exist for mutual recognition, cross-certification or equivalence agreements. Introducing such mechanisms, even on a bilateral or regional basis, would reduce duplication of compliance efforts for internationally active producers and support the longer-term development of the certification landscape.

6 | Conclusions

This study has presented and applied a five-step method for assessing the degree of convergence and institutional robustness of sustainability certification standards within a given industry. The method was developed to address a broader challenge observed across sectors. Although cross-industry certification standards such as the ISO 14000 series or SA8000 offer general environmental and social benchmarks, many industries are increasingly adopting sector-specific standards tailored to their operational specificities.

However, in the absence of globally recognised models, these sector-specific standards often remain fragmented across national contexts, limiting their recognition, legitimacy, effectiveness and strategic value. In this context, the method introduced in this study provides a structured approach to evaluate how far an industry has advanced in the convergence process of its sustainability certification standards.

To illustrate its application, the method was tested in the film industry, where different national certification standards coexist. The findings confirm the presence of substantial fragmentation and reveal the emergence of more structured certifications, such as Albert and EcoProd, that show partial alignment with internationally recognised environmental standards, suggesting that an early-stage convergence process is underway. This pattern is consistent with sectoral evolution observed in more mature domains, such as chemical production, with its Responsible Care initiative and event management, with ISO 20121, where national certification standards have progressively consolidated into global benchmarks. The analysis indicates that certification standards can be used strategically to reinforce corporate credibility and respond to increasing demands for accountability for sustainability.

Relevant implications can be drawn from our findings for practitioners, standard setters and managers in the film production sector.

For practitioners and film production companies, the results highlight the importance of adopting standards that incorporate measurable requirements, third-party audits and transparent reporting mechanisms. Certification standards such as Albert and EcoProd, which integrate structured carbon accounting and mandatory audit procedures, offer clearer reputational and accountability benefits than principle-based approaches (Connelly et al. 2011). In highly visible sectors like the film industry, where public scrutiny and stakeholder expectations are elevated, adherence to robust sustainability standards functions both as a governance mechanism and a

strategic tool for credibility building (Gehman et al. 2017; Gulluscio 2023).

For managers and sustainability coordinators within film production companies, the findings highlight both the signaling potential and the operational challenges associated with certification adoption. Although standards can enhance reputational capital and stakeholder trust, they also require organisational readiness, capacity-building and resource allocation. The inclusion of mandatory audits and CO₂ emission targets, as seen in more mature certifications, often entails higher compliance costs, but also provides more credible assurances of sustainability performance (Kääpä and Vaughan 2022a). Film production managers and sustainability coordinators should therefore balance reputational incentives with operational feasibility when choosing to adopt and implement certification schemes.

The present study is not free of limitations. One limitation of the study is its focus on a selected set of prominent certification standards currently adopted in the film industry across Europe and North America. Although this scope ensures analytical depth and relevance within well-established frameworks, it may not fully capture the diversity of certification practices globally. Future research could apply the proposed method to a broader range of geographical contexts and emerging standards to further evaluate its comparative potential. Another limitation relates to the cross-sectional nature of the analysis, which captures the state of certification standards at a specific moment in time. Although the proposed method enables a rigorous assessment of structural robustness and convergence status, future research could apply it longitudinally to observe whether and how certification standards evolve toward greater alignment over time.

A further consideration concerns the environmental scope of the dimensional framework. Because the FBCA dimensions are derived from the ISO 14000 series, the method in its current configuration does not capture social or governance dimensions of sustainability. This reflects the orientation of the standards examined, all of which focus on environmental performance. In future applications, particularly in sectors where certification standards address a broader range of ESG dimensions, the benchmark could be supplemented or replaced (e.g., by integrating ISO 26000 for social responsibility or SA8000 for labour standards), and additional dimensions could be added to the FBCA accordingly.

From a methodological standpoint, the five-step approach is designed for application beyond the film industry. Its modular structure allows adaptation of the benchmark framework, the FBCA dimensions and the threshold cut-points to sectors with different sustainability priorities, regulatory environments and data conditions. More specifically, the methodological contribution of the study lies in the integration of comparative framework-based assessment, binary index construction, gap analysis, threshold-based categorisation and robustness checks within a single replicable analytical configuration. These tools have been used separately in previous research, but their combination here provides a structured protocol for assessing certification standards as institutional architectures. The framework

is transferable across sectors and facilitates a more systematic comparison of the structural robustness and possible alignment of certification standards across different contexts.

The method also lends itself to longitudinal application. Repeating the assessment at successive points in time would allow researchers to track whether standards progressively incorporate new structural features, whether newly established standards adopt design elements from existing high-scoring frameworks and whether coordination mechanisms across national boundaries begin to emerge. Evidence of this kind would provide a more direct basis for assessing convergence trends than the cross-sectional snapshot offered by the present study. It would also make it possible to distinguish between sustained directional alignment and temporary or coincidental similarity across standards. Longitudinal replication therefore represents a natural next step for future research in this area.

Future applications of the method could also benefit from the adoption of more advanced comparative techniques. Where a larger number of certification standards is available for analysis or where the coding scheme can be extended to capture more granular features of each standard, techniques such as similarity analysis or hierarchical clustering could be used to identify grouping patterns across certification frameworks and to detect structural affinities that a binary mapping alone may not fully reveal. Such techniques would complement the FBCA and DVI approach by adding a layer of pattern recognition to the comparative assessment, potentially offering additional insight into the structural trajectories through which certification standards develop and differentiate.

As with any application of the AHP procedure, the pairwise comparisons underlying the weights involve a degree of evaluative judgement. In this study, the comparisons were informed by the ISO 14000 framework and the certification literature, but different stakeholder perspectives, such as those of producers, regulators or environmental agencies, might lead to different weighting profiles. Future applications could incorporate multistakeholder elicitation in the AHP procedure to explore the sensitivity of the results to alternative weightings and to reflect a broader range of perspectives on the relative salience of certification dimensions.

Author Contributions

Teresa Turzo: writing – original draft, writing – review and editing, conceptualization, methodology, validation, formal analysis. **Cecilia Chirieleison:** writing – original draft, writing – review and editing, methodology, validation. **Carmela Gulluscio:** writing – review and editing, validation. **Giacomo Marzi:** writing – original draft, writing – review and editing, supervision, conceptualization.

Acknowledgements

Open access publishing facilitated by Università degli Studi di Perugia, as part of the Wiley - CRUI-CARE agreement.

Funding

The authors have nothing to report.

References

- Albert. 2020. "Subtitles to Save the World – 2: We Revisit How the Broadcasting Community Is Covering the Climate on Screen." November 2020.
- Ares-Sainz, J. L., A. Arias, N. Matovic, L. Ladu, G. Feijoo, and M. T. Moreira. 2025. "Key Governance and Sustainability Indicators for Certification Systems: Bridging Certification and Policy Frameworks in the Bioeconomy." *Sustainable Production and Consumption* 56: 156–181. <https://doi.org/10.1016/j.spc.2025.03.017>.
- Auld, G. 2014. *Constructing Private Governance: The Rise and Evolution of Forest, Coffee, and Fisheries Certification*. Yale University Press.
- Auld, G., L. H. Gulbrandsen, and C. L. McDermott. 2008. "Certification Schemes and the Impacts on Forests and Forestry." *Annual Review of Environment and Resources* 33, no. 1: 187–211. <https://doi.org/10.1146/annurev.enviro.33.013007.103754>.
- Bartley, T. 2007. "Institutional Emergence in an Era of Globalization: The Rise of Transnational Private Regulation of Labor and Environmental Conditions." *American Journal of Sociology* 113, no. 2: 297–351. <https://doi.org/10.1086/518871>.
- Battisti, E., S. Bo, F. Petruzzella, and A. Salvi. 2025. "Greenwashing and Sustainability Disclosure in the Climate Change Context: The Influence of Third-Party Certification on Chinese Companies." *Business Strategy and the Environment* 34, no. 6: 7851–7863. <https://doi.org/10.1002/bse.70000>.
- Bell, S., and S. Morse. 2010. *Sustainability Indicators: Measuring the Immeasurable?* 2. ed., rev. ed., repr ed. Earthscan Publ.
- Bozak, N. 2011. *The Cinematic Footprint Lights, Camera, Natural Resources*. Routledge University Press.
- Cao, R. Q., D. G. Schniederjans, V. C. Gu, and M. J. Schniederjans. 2019. "Exploring the Relationship Between Corporate Responsibility and Firm Performance From a Social Media Perspective." *Social Responsibility Journal* 15, no. 3: 296–317. <https://doi.org/10.1108/SRJ-09-2017-0176>.
- Chin, K., S. Chiu, and V. M. Rao Tummala. 1999. "An Evaluation of Success Factors Using the AHP to Implement ISO 14001-Based EMS." *International Journal of Quality & Reliability Management* 16, no. 4: 341–362. <https://doi.org/10.1108/02656719910248226>.
- Chirieleison, C., and F. Rizzi. 2020. "ISO 20121 Standard (Event Sustainability)." In *Encyclopedia of Sustainable Management*, edited by S. O. Idowu, N. Capaldi, N. Zu, M. Del Baldo, and R. Abreu, 240–262. Springer. https://doi.org/10.1007/978-3-031-25984-5_137.
- Connelly, B. L., S. T. Certo, R. D. Ireland, and C. R. Reutzel. 2011. "Signalling Theory: A Review and Assessment." *Journal of Management* 37, no. 1: 39–67. <https://doi.org/10.1177/0149206310388419>.
- Corbett, C. J., and D. A. Kirsch. 2001. "International Diffusion of ISO 14000 Certification." *Production and Operations Management* 10, no. 3: 327–342. <https://doi.org/10.1111/j.1937-5956.2001.tb00378.x>.
- Delmas, M. A., and M. J. Montes-Sancho. 2010. "Voluntary Agreements to Improve Environmental Quality: Symbolic and Substantive Cooperation." *Strategic Management Journal* 31, no. 6: 575–601. <https://doi.org/10.1002/smj.826>.
- Delmas, M. A., and M. W. Toffel. 2008. "Organisational Responses to Environmental Demands: Opening the Black Box." *Strategic Management Journal* 29, no. 10: 1027–1055. <https://doi.org/10.1002/smj.701>.
- Depoorter, C., and A. Marx. 2024. "Fostering Compliance With Voluntary Sustainability Standards Through Institutional Design: An Analytic Framework and Empirical Application." *Regulation & Governance* 18, no. 4: 1132–1152. <https://doi.org/10.1111/rego.12573>.
- DiMaggio, P. J., and W. W. Powell. 1983. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organisational Fields." *American Sociological Review* 48: 147–160.
- D'Urso, F. 2022. "Green Policies and New Green Protocols for the Audiovisual Industry Promoted in Italy by State and Regions." *Journal of Media, Performing Arts and Cultural Studies* 2: 164–179. https://doi.org/10.26350/001200_000155.
- EcoProd. 2024. *Synthèse de l'Étude d'Impact de l'Éco-Production Audiovisuelle*. EcoProd.
- Elalfy, A., O. Weber, and S. Geobey. 2021. "The Sustainable Development Goals (SDGs): A Rising Tide Lifts All Boats? Global Reporting Implications in a Post SDGs World." *Journal of Applied Accounting Research* 22, no. 3: 557–575. <https://doi.org/10.1108/JAAR-06-2020-0116>.
- Ferrón-Vílchez, V., J. Valero-Gil, and I. Suárez-Perales. 2021. "How Does Greenwashing Influence Managers' Decision-Making? An Experimental Approach Under Stakeholder View." *Corporate Social Responsibility and Environmental Management* 28, no. 2: 860–880. <https://doi.org/10.1002/csr.2095>.
- Fransen, L. W., and A. Kolk. 2007. "Global Rule-Setting for Business: A Critical Analysis of Multi-Stakeholder Standards." *Organization* 14, no. 5: 667–684. <https://doi.org/10.1177/1350508407080305>.
- Gamper-Rabindran, S., and S. R. Finger. 2013. "Does Industry Self-Regulation Reduce Pollution? Responsible Care in the Chemical Industry." *Journal of Regulatory Economics* 43, no. 1: 1–30. <https://doi.org/10.1007/s11149-012-9197-0>.
- Gehman, J., L. M. Lefsrud, and S. Fast. 2017. "Social License to Operate: Legitimacy by Another Name?" *Canadian Public Administration* 60, no. 2: 293–317. <https://doi.org/10.1111/capa.12218>.
- Ghobadian, A., I. Talavera, A. Bhattacharya, V. Kumar, J. A. Garza-Reyes, and N. O'Regan. 2020. "Examining Legitimation of Additive Manufacturing in the Interplay Between Innovation, Lean Manufacturing and Sustainability." *International Journal of Production Economics* 219: 457–468. <https://doi.org/10.1016/j.ijpe.2018.06.001>.
- Gilbert, D. U., and A. Rasche. 2007. "Discourse Ethics and Social Accountability: The Ethics of SA 8000." *Business Ethics Quarterly* 17, no. 2: 187–216. <https://doi.org/10.2307/27673172>.
- Green Film. 2022. *Rating System for Sustainable Film Production*. 2nd ed. <https://www.green.film/download/>.
- Green Media Solutions and Earth Angel Sustainable Production Services. 2014. *PGA Green Unified Best Practices Guide*. Producers Guild of America. <https://greenproductionguide.com/wp-content/uploads/2014/04/PGA-Green-Unified-Best-Practices-Guide-REV.pdf>.
- Gulluscio, C. 2023. "Legitimacy Theory." In *Encyclopedia of Sustainable Management*, edited by S. O. Idowu, R. Schmidpeter, N. Capaldi, L. Zu, M. Del Baldo, and R. Abreu, 2209–2215. Springer International Publishing. https://doi.org/10.1007/978-3-031-25984-5_175.
- Hahn, R., and M. Kühnen. 2013. "Determinants of Sustainability Reporting: A Review of Results, Trends, Theory, and Opportunities in an Expanding Field of Research." *Journal of Cleaner Production* 59: 5–21. <https://doi.org/10.1016/j.jclepro.2013.07.005>.
- Kääpä, P., and H. Vaughan, eds. 2022a. *Film and Television Production in the Age of Climate Crisis: Towards a Greener Screen*. Springer International Publishing. <https://doi.org/10.1007/978-3-030-98120-4>.
- Kääpä, P., and H. Vaughan. 2022b. "From Content to Context (and Back Again): New Industrial Strategies for Environmental Sustainability in the Media." In *A Companion to Motion Pictures and Public Value*, edited by M. Hjort and T. Nannicelli, 1st ed., 308–326. Wiley. <https://doi.org/10.1002/9781119677154.ch14>.
- Khan, N. U., and M. H. Khan. 2025. "'Soft' Climate Change Exposure and Firm Performance Across Countries: Legitimacy Theory Perspective." *Business Strategy and the Environment* 34, no. 7: 8554–8570. <https://doi.org/10.1002/bse.70029>.

- King, A. A., M. J. Lenox, and A. Terlaak. 2005. "The Strategic Use of Decentralized Institutions: Exploring Certification With the ISO 14001 Management Standard." *Academy of Management Journal* 48, no. 6: 1091–1106. <https://doi.org/10.5465/amj.2005.19573111>.
- Labella, R. C., F. Fort, and M. Parras Rosa. 2024. "The ISO 14001 Standard's Effect on Agrifood Small- and Medium-Sized Enterprises' Performance: Literature Review and Empirical Evidence." *Business Strategy and the Environment* 33, no. 7: 6547–6564. <https://doi.org/10.1002/bse.3818>.
- Ladu, L., N. Matović, E. Imbert, and A. G. Encino-Munoz. 2025. "How to Measure the Robustness and Effectiveness of Certification Schemes and Labels in Ensuring the Sustainability of Bio-Based Products." *Journal of Environmental Management* 390: 126240. <https://doi.org/10.1016/j.jenvman.2025.126240>.
- Lambin, E. F., and T. Thorlakson. 2018. "Sustainability Standards: Interactions Between Private Actors, Civil Society, and Governments." *Annual Review of Environment and Resources* 43, no. 1: 369–393. <https://doi.org/10.1146/annurev-environ-102017-025931>.
- Martinez, F. 2025. "Drifting Ideals: Sustainability Labels and the Syncratic Ethics of Certification." *Business Strategy and the Environment* 35: 5394–5409. <https://doi.org/10.1002/bse.70447>.
- Marx, A., C. Depoorter, S. Fernandez de Cordoba, et al. 2024. "Global Governance Through Voluntary Sustainability Standards: Developments, Trends and Challenges." *Global Policy* 15, no. 4: 708–728. <https://doi.org/10.1111/1758-5899.13401>.
- Maxwell, R., and T. Miller. 2012. *Greening the Media*. Oxford University Press.
- Moldan, B., S. Janoušková, and T. Hák. 2012. "How to Understand and Measure Environmental Sustainability: Indicators and Targets." *Ecological Indicators* 17: 4–13. <https://doi.org/10.1016/j.ecolind.2011.04.033>.
- Nardo, M., M. Saisana, A. Saltelli, and S. Tarantola. 2005. *Tools for Composite Indicators Building*. European Commission. <https://publications.jrc.ec.europa.eu/repository/handle/JRC31473>.
- OECD, European Union, and Joint Research Centre—European Commission. 2008. *Handbook on Constructing Composite Indicators: Methodology and User Guide*. OECD. <https://doi.org/10.1787/9789264043466-en>.
- Ontario Creates. 2020. *Ontario Production Guide*. Ontario Creates. <https://digitallibrary.ontariocreates.ca/DigitalLibrary/ProductionGuide/ProductionGuide.aspx?from=menu>.
- O'Regan, N., and A. Ghobadian. 2002. "Strategic Planning: The Key to Enhanced Performance?" *Business Process Management Journal* 8, no. 5: 416–429. <https://doi.org/10.1108/14637150210449102>.
- O'Regan, N., and A. Ghobadian. 2004. "Leadership and Strategy: Making It Happen." *Journal of General Management* 29, no. 3: 76–92. <https://doi.org/10.1177/030630700402900305>.
- Orzes, G., F. Jia, M. Sartor, and G. Nassimbeni. 2017. "Performance Implications of SA8000 Certification." *International Journal of Operations & Production Management* 37, no. 11: 1625–1653. <https://doi.org/10.1108/IJOPM-12-2015-0730>.
- Pedersen, E. R. G., P. Neergaard, J. T. Pedersen, and W. Gwozdz. 2013. "Conformance and Deviance: Company Responses to Institutional Pressures for Corporate Social Responsibility Reporting." *Business Strategy and the Environment* 22, no. 6: 357–373. <https://doi.org/10.1002/bse.1743>.
- Podrecca, M., M. Molinaro, M. Sartor, and G. Orzes. 2024. "The Impact of ISO 45001 on Firms' Performance: An Empirical Analysis." *Corporate Social Responsibility and Environmental Management* 31, no. 5: 4581–4595. <https://doi.org/10.1002/csr.2782>.
- Raimi, L., I. Akhuemonkhan, and O. D. Ogunjirin. 2015. "Corporate Social Responsibility and Entrepreneurship (CSRE): Antidotes to Poverty, Insecurity and Underdevelopment in Nigeria." *Social Responsibility Journal* 11, no. 1: 56–81. <https://doi.org/10.1108/SRJ-11-2012-0138>.
- Ruiz Guzmán, N. D. 2022. "Ecological Cinema With Best Practices and Reducing Environmental Impact." *Avanca Cinema Journal* 13: 833–839. <https://doi.org/10.37390/avancacinema.2022.a463>.
- Saaty, T. L. 1980. *The Analytic Hierarchy Process*. Vol. 175. McGraw-Hill.
- Shoosharian, S., T. Maqsood, P. S. P. Wong, A. Zaman, S. Caldera, and T. Ryley. 2024. "Utilisation of Certification Schemes for Recycled Products in the Australian Building and Construction Sector." *Business Strategy and the Environment* 33, no. 3: 1759–1777. <https://doi.org/10.1002/bse.3568>.
- Suchman, M. C. 1995. "Managing Legitimacy: Strategic and Institutional Approaches." *Academy of Management Review* 20: 571–610.
- The Guardian. 2022. *Thai Court Orders Repair of the Beach Location 22 Years After Filming Thailand*. The Guardian.
- Turzo, T., A. Montrone, and C. Chirieleison. 2024. "Social Accountability 8000: A Quarter Century Review." *Journal of Cleaner Production* 441: 140960. <https://doi.org/10.1016/j.jclepro.2024.140960>.
- UNCTAD. 2020a. *Framework for the Voluntary Sustainability Standards (VSS) Assessment Toolkit*. United Nations Conference on Trade and Development. https://unctad.org/system/files/official-document/ditctabinf2020d5_en.pdf.
- UNCTAD. 2020b. *The Voluntary Sustainability Standards Assessment Toolkit*. United Nations. https://unctad.org/system/files/official-document/ditctabinf2020d4_en.pdf.
- Valero-Gil, J., T. Daddi, S. Scarpellini, and L. Marrucci. 2024. "Determinants and Benefits of Over-Certification: A Signalling Theory Perspective." *Corporate Social Responsibility and Environmental Management* 31, no. 6: 5984–5999. <https://doi.org/10.1002/csr.2901>.
- Valero-Gil, J., I. Suárez-Perales, and V. Ferrón-Vilchez. 2025. "Would You Date a Liar? The Impact of Greenwashing on B2B Relationships Under the Managerial Trust View." *BRQ Business Research Quarterly* 28, no. 3: 731–749. <https://doi.org/10.1177/23409444241250360>.
- Valero-Gil, J., J. A. Surroca, J. A. Tribo, L. Gutierrez, and I. Montiel. 2023. "Innovation vs. Standardization: The Conjoint Effects of Eco-Innovation and Environmental Management Systems on Environmental Performance." *Research Policy* 52, no. 4: 104737. <https://doi.org/10.1016/j.respol.2023.104737>.
- Victory, J. 2015. "Green Shoots: Environmental Sustainability and Contemporary Film Production." *Studies in Arts and Humanities* 1, no. 1: 54–68. <https://doi.org/10.18193/sah.v1i1.6>.
- Visser, W. 2010. "CSR 2.0: From the Age of Greed to the Age of Responsibility." In *Critical Studies on Corporate Responsibility, Governance and Sustainability*, edited by W. Sun, J. Stewart, and D. Pollard, 231–251. Emerald Group Publishing Limited. [https://doi.org/10.1108/S2043-9059\(2010\)0000001016](https://doi.org/10.1108/S2043-9059(2010)0000001016).
- Vogel, D. 2008. "Private Global Business Regulation." *Annual Review of Political Science* 11, no. 1: 261–282. <https://doi.org/10.1146/annurev.polisci.11.053106.141706>.
- Wooldridge, J. M. 2012. *Introductory Econometrics: A Modern Approach*. 5th ed. Cengage Learning.

Appendix A

TABLE A1 | Sustainability certification standards selected for the analysis.

Standard name	Country of origin
Albert Certification	United Kingdom
EcoProd Initiative	France
Green Film Rating System	Italy
PGA Green Initiative	United States
Ontario Green Screen Initiative	Canada

Appendix B

The present appendix describes the robustness check conducted on the DVI scores through the application of the AHP, a structured decision-making method used to assign differentiated weights to criteria based on their relative importance. In the AHP, decision-makers compare criteria in pairs and express the intensity of importance using a 1–9 scale, where 1 indicates equal importance, and 9 indicates extreme importance of one criterion over another (Chin et al. 1999; Saaty 1980). The resulting pairwise comparison matrix is used to derive a consistent vector of normalised weights.

The weighting structure was developed in alignment with the ISO 14001 series, which outlines the core principles of environmental management systems. Each of the seven FBCA dimensions was mapped to the relevant ISO clauses and compared through pairwise evaluations based on theoretical relevance and operational centrality. Greater weights were assigned to audit mechanisms, CO₂ reduction targets, and sustainability scope, in accordance with the emphasis of the ISO 14001 series on leadership, planning and performance evaluation. Dimensions such as international applicability and biodiversity protection received lower weights, reflecting their relatively limited integration into institutional requirements.

The full pairwise comparison matrix is presented in Table B1. Each entry $a_{i,j}$ reflects the relative importance of dimension i over j , and reciprocal values are applied symmetrically. Diagonal values are fixed at 1. The resulting consistency ratio was 0.08, below the threshold of 0.10, confirming internal coherence.

TABLE B1 | Full pairwise comparison matrix (based on Saaty scale).

	Audit	CO ₂ targets	Sustainability scope	Circular economy	Mandatory/voluntary	International applicability	Biodiversity
Audit	1	2	3	4	5	7	7
CO ₂ targets	0.50	1	2	3	4	5	6
Sustainability scope	0.33	0.5	1	3	3	4	5
Circular economy	0.25	0.33	0.33	1	2	3	4
Mandatory/voluntary	0.20	0.25	0.33	0.50	1	2	3
International applicability	0.14	0.20	0.25	0.33	0.50	1	2
Biodiversity protection	0.14	0.17	0.20	0.25	0.33	0.50	1

Based on this matrix, the normalised weights were derived and are presented in Table B2. These weights reflect the relative importance of each dimension in assessing the robustness of sustainability standards.

TABLE B2 | AHP-derived weights for FBCA dimensions.

FBCA dimension	ISO 14001 reference	AHP weight
Audit mechanisms	5.1, 9.2—Leadership, Internal audit	0.22
CO ₂ reduction targets	6.2—Environmental objectives	0.20
Scope of sustainability criteria	6.1.2—Environmental aspects	0.18
Circular economy/resource use	8.1—Operational control	0.13
Mandatory or voluntary nature	6.1.3—Compliance obligations	0.10
International applicability	7.4—External communication	0.09
Biodiversity protection	6.1.2—Life cycle thinking	0.08

The weighted scores were calculated using the following formula:

$$DVI_{\text{weighted}} = \sum_{i=1}^N w_i D_i,$$

where D_i is a binary variable indicating compliance with dimension i , and w_i is the corresponding AHP weight. For comparison, equal-weighted scores were also computed by assigning 0.14 to each of the seven dimensions (max score = 0.98). The results are reported in Table 7.