MOTIVES AND CONSTRAINTS OF CARBON ACCOUNTING IN NATIONAL OLYMPIC COMMITTEES

Abstract - National Olympic Committees (NOCs) have made climate commitments, yet little is known about why they engage in carbon accounting or what prevents them from doing so. This study examined the motives for, and constraints on, the measurement, disclosure and assurance of greenhouse gas emissions by NOCs. An online survey was sent to 205 NOCs, of which 41 responded (20%); 24 measured their emissions, 17 disclosed them and five had them assured. The data were analyzed using descriptive statistics and the Fisher–Freeman–Halton exact test. Meeting the obligations of sustainability initiatives was the leading motive for measurement (75%) and disclosure (82%), followed by ethical responsibility and stakeholder expectations. The absence of a sector-specific standard was the most frequently cited reason for not measuring emissions and for outsourcing the calculations. Non-disclosure was mainly attributed to the absence of a regulatory requirement, and a lack of expertise was the main barrier to assurance. Signatories of the United Nations Sports for Climate Action Framework were significantly more likely to engage in all three practices, whereas having a sustainability officer showed no significant association. The findings suggest that, in the absence of regulation, voluntary initiatives exert an informal coercive pressure on NOCs, while gaps in standards, staffing and expertise limit their capacity to respond. Because NOCs already active in sustainability may have been more likely to respond, these findings describe the participating NOCs and should be extended to all NOCs with caution. A sector-specific standard and targeted training are recommended.

Keywords: carbon accounting; Olympic Movement; National Olympic Committees; institutional theory; sustainability.

MOTIVAÇÕES E RESTRIÇÕES DA CONTABILIDADE DE CARBONO NOS COMITÊS OLÍMPICOS NACIONAIS

Resumo - Os Comitês Olímpicos Nacionais (CONs) assumiram compromissos climáticos, mas pouco se sabe sobre porque realizam a contabilidade de carbono ou o que os impede de fazê-lo. Este estudo examinou as motivações e as restrições relacionadas à mensuração, à divulgação e à asseguração das emissões de gases de efeito estufa pelos CONs. Um questionário on-line foi enviado a 205 CONs, dos quais 41 responderam (20%); 24 mensuravam suas emissões, 17 as divulgavam e cinco as haviam submetido a asseguração. Os dados foram analisados por meio de estatística descritiva e do teste exato de Fisher–Freeman–Halton. O cumprimento das obrigações de iniciativas de sustentabilidade foi a principal motivação para a mensuração (75%) e a divulgação (82%), seguido pela responsabilidade ética e pelas expectativas das partes interessadas. A ausência de uma norma setorial específica foi a razão mais citada para não mensurar as emissões e para terceirizar os cálculos. A não divulgação deveu-se sobretudo à ausência de exigência regulatória, e a falta de especialização foi a principal barreira à asseguração. Os signatários do Sports for Climate Action Framework das Nações Unidas apresentaram maior probabilidade de adotar as três práticas, ao passo que a existência de um responsável pela sustentabilidade não apresentou associação significativa. Os resultados sugerem que, na ausência de regulação, as iniciativas voluntárias exercem pressão coercitiva informal sobre os CONs, enquanto lacunas em normas, pessoal e especialização limitam sua capacidade de resposta. Como os CONs já envolvidos com a sustentabilidade podem ter sido mais propensos a responder, os resultados descrevem os CONs participantes e devem ser estendidos ao conjunto dos CONs com cautela. Recomendam-se uma norma setorial específica e capacitação direcionada.

Palavras-chave: contabilidade de carbono; Movimento Olímpico; Comitês Olímpicos Nacionais; teoria institucional; sustentabilidade.

MOTIVACIONES Y LIMITACIONES DE LA CONTABILIDAD DE CARBONO EN LOS COMITÉS OLÍMPICOS NACIONALES

Resumen - Los Comités Olímpicos Nacionales (CON) han asumido compromisos climáticos, pero se sabe poco sobre por qué realizan la contabilidad de carbono o qué les impide hacerlo. Este estudio examinó las motivaciones y las limitaciones de la medición, la divulgación y el aseguramiento de las emisiones de gases de efecto invernadero de los CON. Se envió una encuesta en línea a 205 CON, de los cuales respondieron 41 (20%); 24 medían sus emisiones, 17 las divulgaban y cinco las habían sometido a aseguramiento. Los datos se analizaron mediante estadística descriptiva y la prueba exacta de Fisher–Freeman–Halton. El cumplimiento de las obligaciones de las iniciativas de sostenibilidad fue la principal motivación para la medición (75%) y la divulgación (82%), seguido de la responsabilidad ética y las expectativas de las partes interesadas. La ausencia de una norma sectorial específica fue la razón más citada para no medir las emisiones y para externalizar los cálculos. La no divulgación se debió principalmente a la ausencia de un requisito normativo, y la falta de experiencia fue la principal barrera para el aseguramiento. Los signatarios del Sports for Climate Action Framework de las Naciones Unidas mostraron mayor probabilidad de adoptar las tres prácticas, mientras que contar con un responsable de sostenibilidad no mostró asociación significativa. Los resultados sugieren que, en ausencia de regulación, las iniciativas voluntarias ejercen una presión coercitiva informal sobre los CON, mientras que las carencias en normas, personal y experiencia limitan su capacidad de respuesta. Dado que los CON ya comprometidos con la sostenibilidad pueden haber sido más propensos a responder, los resultados describen a los CON participantes y deben extenderse al conjunto de los CON con cautela. Se recomiendan una norma sectorial específica y formación dirigida.

Palabras-clave: contabilidad de carbono; Movimiento Olímpico; Comités Olímpicos Nacionales; teoría institucional; sostenibilidad.

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Introduction

Extreme heat, flooding and severe weather events have disrupted training, competition and the operation of sports facilities[1]. At the same time, the sector generates emissions through travel, venue energy consumption, equipment manufacture and waste[2]. The Olympic Movement has responded by adopting public emission reduction targets. The International Olympic Committee (IOC) has pledged to reduce its emissions by 50% by 2030[3], and signatories of the United Nations Sports for Climate Action Framework (S4CA) are committed to halving their emissions by 2030, achieving net zero by 2040 and reporting their progress annually[4].

Progress towards such targets cannot be monitored without carbon accounting (CA). Organizations must first identify the sources of their emissions, assign responsibility for them and compare results over time[5]. However, organizational CA is technically demanding and is often regarded as confidential, with the result that relatively little is known about how it is practiced or why organizations choose to adopt it[5]. The sports sector is no exception in this respect[6].

The Olympic Movement comprises 206 National Olympic Committees (NOCs)[7]. Whereas the IOC and the International Federations operate largely at the international level, each NOC operates within its own country, where it is responsible for developing sport at all levels, training coaches and administrators, delivering Olympic education programmes and working with National Federations to select athletes for the Olympic Games[8]. In fulfilling these responsibilities, NOCs interact with a wide network of stakeholders, including governments, sponsors, the media, athletes, clubs and the IOC[9]. Most NOCs are non-profit organizations of small or medium size[10]. They are not subject to mandatory emissions reporting, they do not operate in an emissions-intensive sector, and they rely on the continued support of the stakeholders who fund them[11].

Carbon accounting as a resource-intensive practice

CA may be understood as comprising three interrelated activities. Measurement is the technical activity of converting activity data into emissions; disclosure is the administrative activity of reporting the methods used and the results obtained; and assurance is the quality-control activity of verifying both[12]. Each activity requires staff time, technical expertise and financial resources. For this reason, climate-related activities

such as CA have been classified in the sport literature as high-intensity initiatives, in contrast to low-cost and highly visible actions such as awareness campaigns[13,14]. The adoption of a high-intensity initiative is therefore likely to depend on two conditions: sufficient pressure or incentive to act[13] and sufficient organizational capacity to do so[15,16].

Drivers of carbon accounting

Organizations measure their emissions in order to manage them, assess their environmental performance and inform internal and external decision-making[17]. In practice, however, the scope of measurement is shaped strongly by external requirements. Organizations tend to measure their direct (Scope 1) and energy-related indirect (Scope 2) emissions because these are required by CA standards or by regulation[18], whereas other indirect (Scope 3) emissions are frequently omitted because they are not mandatory and are more complex to assess[19].

Research on the drivers of carbon disclosure has focused largely on listed companies. Geographic location has been found to be influential, with firms based in countries that ratified the Kyoto Protocol disclosing more than those based elsewhere[20]. Industry type is also relevant, as firms in emissions-intensive sectors such as mining disclose more than service providers[21]. Larger organizations disclose more because they face stricter regulatory requirements and greater media scrutiny[22], while firms with strong carbon performance disclose in order to distinguish themselves from competitors[23]. The presence of a dedicated sustainability officer, committee or environmental management system increases the likelihood of disclosure[24], as does membership of reporting initiatives such as CDP, which require participants to report[15].

Within sport, the pledges and memberships that organizations sign frequently lack specific requirements and have limited capacity to enforce high-intensity actions[25].

In the non-profit sector, reporting appears to be shaped by dependence on resource providers rather than by investors: Verbruggen et al.[26] link compliance with reporting standards to resource dependence and coercive isomorphism, and sustainability reporting is framed as accountability to stakeholders and the public[27,28]. For NOCs, initiative membership and sustainability staff may therefore matter more than industry type, regulation or competitive positioning.

Constraints on carbon accounting

Although the measurement of emissions may appear straightforward, it involves a series of methodological judgements. Organizations must set boundaries, determine which sources to include, select emission factors and obtain data, and each of these steps is a common source of error[29]. Compiling a complete inventory is more difficult where data are unreliable or unavailable and where time and staff are limited[30]. Small organizations face the greatest difficulty, and their inventories frequently fail to reflect the full scale of their operations[31]. Suppliers, in turn, often lack the resources to provide activity-specific data[32].

The available guidance presents a further barrier. The principal standards are generic and leave many methodological choices to the user, which results in inconsistent outcomes across organisations[33]. Several authors contend that generic standards fail to reflect the operations of specific sectors, including sport[2,34]. Expertise is also limited: a shortage of sustainability competences has been reported across many industries[35], and sustainability roles in practice extend across numerous functions beyond carbon management[36].

For most organizations worldwide, disclosure remains voluntary, as mandatory requirements apply mainly to large organizations in particular industries and countries[37]. Where disclosure is voluntary, organizations retain full discretion over what they report and may disclose only minimal information or none at all[38]. Resource constraints also limit disclosure[15]. Uncertainty about the measurement standards applied[39] and insufficient technical understanding of measurement procedures[40] may further discourage organizations from making their results public.

Motives for and constraints on assurance

Assurance verifies whether measurement and disclosure have been carried out in accordance with the applicable guidelines and identifies both unintentional errors and misstatements[12]. It may be conducted internally, although internal assurance is constrained by the complexity of the task, limited experience and potential conflicts of interest[41]. External assurance is provided either by consultancy firms, which are valued for their subject knowledge and lower fees, or by accountancy firms, which are valued for their resources, audit procedures and reputation[42,43]. Large firms, carbon-intensive

industries and organizations subject to stringent environmental legislation tend to engage accountancy firms[44].

Organizations seek assurance in order to improve their reporting processes[44,45], enhance the credibility of their disclosures[46] and demonstrate their commitment to sustainability[47]. The principal barriers relate to cost and capability. Assurance may account for up to 80% of the total cost of CA for small organizations[48], and it requires considerable internal effort to prepare evidence for the assurance provider[49]. It also requires expertise in both emissions accounting and auditing[50], and assurance practices vary considerably across organizations, industries and countries[44]. Because assurance remains largely voluntary, many organizations assign it a low priority[51,52]. Where assurance is obtained, limited rather than reasonable assurance is the norm, principally because it is less costly[53].

Theoretical framework

Several theoretical perspectives have been used to explain why organizations account for and report their carbon emissions. Legitimacy theory holds that organizations operate under an implicit social contract and disclose environmental information in order to present themselves as responsible corporate citizens and to avoid scrutiny[54]. Stakeholder theory explains disclosure as a response to pressure from influential groups such as funders, reporting initiatives and the public[55]. Signaling theory regards disclosure as a means of reducing information asymmetry by communicating positive signals, particularly following negative publicity[56]. These perspectives overlap considerably, and each is ultimately concerned with the pursuit of legitimacy[57].

This study adopts institutional theory, which explains how practices diffuse through an organizational field under pressure from other institutions, even where market or legal incentives are weak[58]. DiMaggio and Powell[58] identify three mechanisms of isomorphism through which organizations within a field come to resemble one another. Coercive isomorphism results from formal and informal pressures exerted by entities on which an organization depends, such as governments, funders and stakeholders[59]. Normative isomorphism arises from professional, ethical and moral values, whereas mimetic isomorphism reflects the imitation of practices regarded as best practice within the field[60]. The framework suits NOCs, which belong to a structured field led by the IOC.

Within the Olympic Movement, climate action has become an explicit policy priority. Olympic Agenda 2020+5, launched in March 2021, includes recommendations to foster sustainable Olympic Games and to strengthen the role of sport in achieving the United Nations Sustainable Development Goals[61]. As part of its climate-positive commitment, the IOC has undertaken to support International Federations and NOCs in reducing their emissions through S4CA and has set the objective that NOCs join it; by July 2021, however, only eight NOCs had done so[61]. Pressure on NOCs to account for carbon therefore originates largely within the Olympic Movement rather than from regulation.

Aim and research questions

This study examines the motives for, and constraints on, the measurement, disclosure and assurance of emissions by NOCs. Its aim is to identify the motives that drive NOCs to engage in CA and the constraints that limit their engagement. The following research questions (RQ) are addressed:

- RQ1: What motivates NOCs to measure, disclose and assure their carbon emissions?
- RQ2: What constraints prevent NOCs from measuring their emissions in-house, disclosing them or having them assured?
- RQ3: Is engagement in each CA practice associated with having a sustainability officer, organizational size or S4CA signatory status?

The study provides the first primary evidence on the motives for, and constraints on, CA within NOCs, a group of organizations that has received little attention in the sport sustainability literature[2].

Methods

Research design

Previous studies of environmental practice in sport organizations have relied almost exclusively on the analysis of organizational website content[6,14]. Although website material is readily accessible, it is difficult to verify. It is unstructured, may be outdated

and is controlled by the organization itself; consequently, it tends to report favorable actions while omitting the reasons behind them[14]. In response to calls for primary data from sport organisations[14], this study employed a cross-sectional online survey administered directly to NOCs.

Population and sampling frame

The study population comprised all 206 NOCs recognized by the IOC. Official contact details were compiled from the IOC and Association of National Olympic Committees (ANOC) websites[7,62]. An online survey was considered appropriate for this population for several reasons: all NOCs could be contacted by email; the population was distributed across five continents and multiple time zones; and the method allowed data to be collected rapidly and at low cost without the need for manual data entry[63].

Survey instrument

The questionnaire comprised six sections. The opening page set out the purpose of the study and the participant information sheet, and respondents were required to tick a consent box before proceeding. The next three sections addressed the measurement, disclosure and assurance of emissions. The fifth section concerned the development of a sector-specific carbon footprint standard, and the final section collected organizational information, including staff numbers, the presence of a sustainability officer or team, and S4CA signatory status.

Display and skip logic was used to direct respondents to the questions relevant to them. Motive and constraint questions were therefore shown according to whether a NOC measured, outsourced, disclosed and assured its emissions; options were derived from the literature, included an "Other" field and allowed multiple selections.

The survey was written in plain language and avoided specialist terminology, as not all NOCs employ a sustainability specialist. It was designed to take between 10 and 20 minutes to complete in order to limit respondent fatigue[64], included a progress bar and was optimized for mobile devices. Prior to distribution, the survey was piloted with academics, researchers, practitioners and members of the public[65]. In response to their feedback, several open questions were converted to a multiple-choice format, lengthy questions were divided and related items were grouped together. Pilot participants

reported no difficulties with the clarity of the questions, the survey interface or the length of the survey.

Ethical considerations

Approval for the study was granted by the Faculty of Science and Engineering Ethics Committee at the University of Hull (Ref: FEC_2024_59). To prevent responses from outside the target population and duplicate submissions, each NOC received a unique, single-use survey link.

Data collection

The survey remained open for eight weeks, between 25 November 2024 and 19 January 2025. Email addresses were available for 205 NOCs, as one NOC was suspended at the time. Seven invitations could not be delivered, and alternative addresses were sought from the official websites of the NOCs concerned where these were available. Two reminders were sent: the first two weeks after the initial invitation and the second two weeks before the survey closed.

A total of 41 NOCs responded, representing a response rate of 20%. This rate falls within the range regarded as acceptable for surveys of small populations ($n < 250$)[66] and within the range of 19% to 61% typically reported for online surveys[67]. It is also comparable with response rates reported in surveys of small and medium-sized enterprises[68], the size category to which most NOCs belong[10]. Nevertheless, a response rate of 20% leaves four in five NOCs unobserved. The results are therefore reported as describing the 41 participating NOCs, whose characteristics are summarized in Table 1, rather than the population of NOCs as a whole.

Non-response bias

A low response rate does not by itself bias survey findings; non-response bias arises when non-respondents differ systematically from respondents on the variables being measured[69]. Of the four principal methods for assessing this bias[70], three require information about the population or a follow-up survey of non-respondents; apart from the continental association of each NOC, neither was available. Extrapolation was therefore adopted. This method treats late respondents as proxies for non-respondents on

the basis that they responded only after receiving reminders[71], and it is the most widely used approach for this purpose[68].

Submission timestamps were used to divide the sample into quartiles, with respondents in the first quartile classified as early and those in the fourth quartile as late. Kolmogorov–Smirnov and Shapiro–Wilk tests indicated that most variables were not normally distributed. Early and late respondents were therefore compared using the Mann–Whitney U test for non-normally distributed variables, the independent samples t-test for normally distributed variables and Fisher's exact test for dichotomous variables, the latter being more accurate than the chi-square test where cell counts are small. No statistically significant differences were identified between early and late respondents. This result does not show that the sample is free from non-response bias. The extrapolation method assumes that late respondents resemble non-respondents, an assumption that cannot be tested directly[70,71], and the tests could detect only large differences. The absence of significant differences is therefore treated as an absence of evidence of bias, and not as evidence that bias is absent.

Self-selection is a further concern. NOCs that are already engaged in sustainability, or that employ staff responsible for it, may have been more willing to complete a survey on CA than NOCs with no such engagement. If so, the proportions of NOCs that measure, disclose and assure their emissions reported here are likely to overstate those among all NOCs. The data support this concern. Twenty-five of the 41 respondents (61%) were S4CA signatories, whereas the 71 NOCs that had joined S4CA by December 2024[72] represented about 35% of the NOCs contacted; signatories therefore responded at roughly three times the rate of non-signatories (35% and 12%, respectively; Table 1). Because S4CA signatory status was associated with all three CA practices, this imbalance is likely to inflate the reported prevalence of measurement, disclosure and assurance. As late respondents also chose to respond, the comparison of early and late respondents cannot detect this form of bias.

Data analysis

Motives and constraints were analyzed using counts and percentages. Because respondents could select more than one motive or constraint, percentages were calculated with the number of NOCs in the relevant group as the denominator and do not sum to

100%; the denominator for each analysis is stated in the corresponding table. Associations between engagement in CA and three organizational factors (the presence of a sustainability officer or team, hereafter referred to as a sustainability officer, the number of employees and S4CA signatory status) were tested using the Fisher–Freeman–Halton exact test, an extension of Fisher's exact test to contingency tables larger than 2 × 2 that is appropriate for small samples[73]. Statistical significance was set at $p < 0.05$. As the sample was self-selected rather than random, the tests indicate whether associations among the participating NOCs are larger than would be expected by chance; they do not provide estimates for all NOCs. Analyses were conducted in IBM SPSS Statistics version 29.0.2.0 (20).

Results

Participating NOCs

Table 1 compares the participating NOCs with the NOCs contacted. Responses were received from all five continental associations, with response rates ranging from 9% in Asia to 39% in Europe. European NOCs therefore make up 46% of the respondents but only 24% of the NOCs contacted, whereas Asian NOCs make up 10% and 21%, respectively. Twenty-five of the 41 NOCs (61%) had a full-time sustainability officer or team, three (7%) had a part-time officer and 13 (32%) had none. S4CA signatories accounted for 61% of respondents, compared with about 35% of the NOCs contacted. Most respondents were small organizations: 31 (76%) had fewer than 50 employees.

Table 1 - Characteristics of the participating NOCs (n = 41) and the NOCs contacted (N = 205).

Characteristic	NOCs contacted, n	Respondents, n (%)	Response rate (%)
Continental association			
Africa (ANOCA)	54	8 (20)	15
Americas (Panam Sports)	41	8 (20)	20
Asia (OCA)	44	4 (10)	9
Europe (EOC)	49	19 (46)	39
Oceania (ONOC)	17	2 (5)	12
Sustainability officer or team			
Full-time	–	25 (61)	–
Part-time	–	3 (7)	–
None	–	13 (32)	–
S4CA signatory			
Yes	71[a]	25 (61)	35
No	134[a]	16 (39)	12
Number of employees			
1–9	–	15 (37)	–
10–49	–	16 (39)	–
50–99	–	6 (15)	–
100–249	–	3 (7)	–
250 or more	–	1 (2)	–
Total	**205**	**41 (100)**	**20**

Source: the author.

[a] Approximate, based on the 71 NOCs that had joined S4CA by December 2024[72].

Note: NOCs contacted excludes one European NOC that was suspended at the time of the survey. ANOCA, Association of National Olympic Committees of Africa; Panam Sports, Pan American Sports Organization; OCA, Olympic Council of Asia; EOC, European Olympic Committees; ONOC, Oceania National Olympic Committees. Response rate = respondents / NOCs contacted × 100. Percentages may not sum to 100 because of rounding. – = not available for the population.

Of the 41 responding NOCs, 24 measured their emissions, 14 of which outsourced the calculations, and 17 disclosed them.

Motives for measuring and disclosing

Meeting the obligations of joined initiatives was the most frequently cited motive for measuring emissions, selected by 18 of the 24 NOCs that measured (75%; Table 2). Ethical responsibility (63%) and meeting sector and stakeholder expectations (46%) were the next most common motives, while cost reduction was the least frequently selected (17%).

Table 2 - Motives for measuring emissions (n = 24)

Motives for measuring	n (%)
Meet obligation of joined initiatives	18 (75)
Ethical responsibility	15 (63)
Meet sector and stakeholders' expectations	11 (46)
Strengthen and protect reputation	10 (42)
Comply with existing and anticipated regulations	9 (38)
Improve operational activities	9 (38)
Culture of the organisation	9 (38)
Reduce costs	4 (17)

Source: the author.
Note: Respondents could select more than one option, so percentages do not sum to 100%. Percentages are calculated on the number of NOCs in the group (n).

A similar pattern emerged for disclosure. Participation in sustainability initiatives was selected by 14 of the 17 disclosing NOCs (82%), considerably more than transparency with stakeholders and investors (47%) or reputation and brand enhancement (41%) (Table 3). Two of the three leading motives for measurement and disclosure therefore relate to initiatives and stakeholders. Demonstrating strong carbon performance (24%) and competitive advantage (18%) were the least frequently selected motives.

Table 3 - Motives for disclosing emissions (n = 17)

Motives for disclosing	n (%)
Participation in sustainability initiatives	14 (82)
Transparency with stakeholders and investors	8 (47)
Reputation and brand enhancement	7 (41)
Regulatory compliance	6 (35)
Demonstrate strong carbon performance	4 (24)
Competitive advantage	3 (18)

Source: the author.
Note: Respondents could select more than one option, so percentages do not sum to 100%. Percentages are calculated on the number of NOCs in the group (n).

Constraints on measuring

NOCs that did not measure their emissions (n = 17) and those that outsourced their calculations (n = 14) cited the same three principal reasons (Table 4): the lack of a sector-specific standard, staff constraints and insufficient technical knowledge of the procedures involved. Data collection challenges and budget constraints were common among non-measuring NOCs but rare or absent among outsourcing NOCs, which cited time constraints more often.

Table 4 - Reasons for not measuring emissions and for outsourcing the calculations, n (%)

Reasons	NOCs not measuring (n = 17)	NOCs outsourcing (n = 14)
Lack of sector-specific standard	12 (71)	11 (79)
Staff constraints	11 (65)	9 (64)
Lack of technical knowledge of procedures	10 (59)	8 (57)
Data collection challenges	9 (53)	1 (7)
Budget constraints	8 (47)	0 (0)
Time constraints	6 (35)	7 (50)
Data reliability	4 (24)	1 (7)
Lack of support from top management	2 (12)	0 (0)
Other	2 (12)	1 (7)

Source: the author.
Note: Respondents could select more than one option, so percentages do not sum to 100%. Percentages are calculated on the number of NOCs in the group (n).

Ten of the 14 outsourcing NOCs had a full-time sustainability officer or team, a proportion similar to that among NOCs that measured in-house (7 of 10). Among NOCs that did not measure their emissions, 9 of 17 had either a full-time or a part-time officer (Table 5).

Table 5 - Sustainability officer by CA group, n (%)

Group	Full-time	Part-time	None
Measured and outsourced (n = 14)	10 (71)	1 (7)	3 (21)
Measured in-house (n = 10)	7 (70)	1 (10)	2 (20)
Did not measure (n = 17)	8 (47)	1 (6)	8 (47)
All respondents (n = 41)	25 (61)	3 (7)	13 (32)

Source: the author.
Note: Each NOC is counted once. Percentages are row percentages.

Constraints on disclosing

Seven NOCs measured their emissions but did not disclose them. Four of these cited the absence of a regulatory requirement to disclose, and three cited limited resources for disclosure (Table 6).

Table 6 - Reasons for not disclosing emissions (n = 7)

Reasons for not disclosing	n (%)
No regulatory requirement	4 (57)
Limited resources for disclosure efforts	3 (43)
Lack of support from top management	2 (29)
Lack of reliable data	1 (14)
See no benefit from disclosure	1 (14)

Source: the author.
Note: Respondents could select more than one option, so percentages do not sum to 100%. Percentages are calculated on the number of NOCs in the group (n).

Assurance

Assurance was uncommon among the participating NOCs. Of the 24 NOCs that measured their emissions, five had obtained assurance, 15 had not and four were unsure. Three of the five relied on internal assurance and two engaged consultancy firms. None engaged an accountancy firm, and all five obtained limited rather than reasonable assurance.

All five assuring NOCs reported that they sought assurance in order to identify areas for improvement in their emissions reporting (Table 7). Four also cited increased credibility and reliability, and four cited the demonstration of commitment to environmental sustainability.

Table 7 - Motives for assuring emissions (n = 5)

Motives for assuring	n (%)
Identify areas for improvement in emissions reporting	5 (100)
Increase credibility and reliability	4 (80)
Demonstrate a commitment to environmental sustainability	4 (80)
Respond to stakeholder expectations	3 (60)
Risk management	3 (60)

Source: the author.
Note: Respondents could select more than one option, so percentages do not sum to 100%. Percentages are calculated on the number of NOCs in the group (n).

A lack of expertise was the predominant reason for not seeking assurance, cited by 13 of the 15 NOCs that had not obtained it (Table 8). The cost of assurance services (six NOCs) and the prioritization of other sustainability initiatives (five NOCs) were the next most common reasons, while only one NOC cited the absence of a regulatory

requirement. The two 'Other' responses described assurance as premature: 'We just began the process' and 'Too early to do so'.

Table 8 - Reasons for not assuring emissions (n = 15)

Assuring constraints	**n (%)**
Lack of expertise	13 (87)
Cost of assurance services	6 (40)
Prioritising other sustainability initiatives	5 (33)
Other	2 (13)
No regulatory requirement for assurance	1 (7)
No obvious value of assurance	1 (7)

Source: the author.
Note: Respondents could select more than one option, so percentages do not sum to 100%. Percentages are calculated on the number of NOCs in the group (n).

Organizational factors

Table 9 presents the associations between the three organisational factors and engagement in each CA practice. S4CA signatory status was significantly associated with measurement ($p = 0.009$), disclosure ($p = 0.003$) and assurance ($p = 0.023$). The number of employees was significantly associated with measurement ($p = 0.014$) and assurance ($p = 0.001$), with larger NOCs more likely to engage in both, but not with disclosure ($p = 0.284$). The presence of a sustainability officer or team was not significantly associated with any of the three practices.

Table 9 - Association between organizational factors and CA practices (Fisher–Freeman–Halton exact test p-values)

	Measuring	**Disclosing**	**Assuring**
Sustainability officer	0.190	0.248	0.479
Number of employees	0.014	0.284	0.001
S4CA signatory	0.009	0.003	0.023

Source: the author.
Note: $p < 0.05$ indicates a statistically significant association. Measurement, disclosure and assurance were each tested across all respondents (n = 41).

Discussion

The findings discussed below describe the 41 participating NOCs. Because NOCs already engaged in sustainability may be over-represented among them, the discussion concentrates on the motives, constraints and associations reported rather than on how common each practice is among all NOCs.

Initiatives as a substitute for regulation

No legal requirement obliges NOCs to measure or disclose their emissions, yet most of the participating NOCs that did so cited the obligations of initiatives to which they belonged. Conversely, the most common reason given by NOCs that measured but did not disclose was the absence of a regulatory requirement. Taken together, these responses suggest that, in the absence of formal mandates, initiatives exert an informal coercive pressure that partly compensates for the lack of regulation. The association between S4CA signatory status and all three practices is consistent with this interpretation, although the small number of non-disclosing NOCs (n = 7) means that this finding should be regarded as indicative only.

This finding qualifies the view, outlined in the Introduction, that pledges and memberships rarely compel high-intensity action[6,25]. This may reflect the terms of the initiative: S4CA signatories must report their progress annually against specific targets[4], which requires measurement and makes disclosure routine. However, NOCs already inclined to engage in CA may be those that choose to sign, and compliance driven by external obligation may produce minimal or symbolic reporting[38].

Stakeholder dependence and public visibility

Meeting stakeholder expectations, transparency and reputation were also among the most frequently cited motives. These motives reflect the position of NOCs as non-profit organizations that depend on funders, sponsors, governments and the public for resources[11]. This dependence creates a coercive dynamic in which NOCs engage in CA in order to maintain stakeholder trust and support[26]. As support for non-profit organizations depends on their performance and transparency[74], the credibility of NOCs rests on meeting stakeholder expectations openly. Nevertheless, such motives should be grounded in a genuine commitment to environmental responsibility rather than serving primarily to protect organizational image or to attract resources[28].

The public profile of NOCs adds a further dimension. As prominent national brands that attract considerable media attention, NOCs are exposed to societal norms regarding sustainability, which constitutes a form of normative pressure[75]. As symbols of national pride, they also risk criticism if they are perceived to neglect climate issues, which exerts a coercive pressure to protect their public image[76].

Ethical responsibility and weak mimetic pressure

Ethical responsibility was the second most frequently cited motive for measurement. Ethical conduct within organizations is often rooted in professionalism, which is a principal source of normative isomorphism[77]. As professional bodies within the Olympic Movement, NOCs may regard environmental responsibility as an integral part of their role.

By contrast, mimetic pressure appears to be weak. Mimetic isomorphism is most pronounced in emissions-intensive sectors[78], and emissions measurement in sport has not yet reached the level of maturity required for it to be regarded as established best practice[79]. The low ranking of competitive advantage and carbon performance, important drivers of corporate disclosure[23], is consistent with the non-profit status of NOCs. Mimetic pressure may nevertheless increase over time, since organizations that measure and report transparently set a benchmark for others to follow[27]. If leading NOCs continue to do so, measurement may become an expected practice across the field.

Capability constraints

The lack of a sector-specific standard was the most frequently cited constraint, which supports the argument that generic standards do not reflect the activities of sport organizations[2,34]. The shared constraints of non-measuring and outsourcing NOCs suggest that outsourcing is a means of overcoming the same capability gap.

Staff constraints may refer either to an insufficient number of staff or to an excessive workload among existing staff. The data suggest that both apply, albeit to different groups. Almost half of the non-measuring NOCs had no sustainability officer, indicating that staff availability is a plausible barrier for these organizations. Most outsourcing NOCs, by contrast, did employ an officer, which points instead to workload. The sustainability role encompasses a broad range of functions and requires coordination across the organization[36], as one respondent explained: ‘We only have one professional in sustainability and the environment; it is a lot of information and work for just one person’.

The absence of an association between the presence of a sustainability officer and CA engagement contrasts with evidence from the corporate sector[24]. This result may be viewed negatively, as it implies that sustainability officers are not effectively advancing

CA within their organizations. Conversely, it suggests that NOCs without dedicated sustainability personnel are not precluded from engaging in CA.

Insufficient technical knowledge was the third shared constraint. Accurate measurement requires expertise in boundary setting, scoping, the selection of emission factors and data collection, all of which are regarded as core competences of sustainability professionals80. Collaboration between NOCs, the wider Olympic Movement and educational institutions could provide targeted training[81], enabling more NOCs to measure their emissions in-house and reducing their expenditure on external providers.

Among the participating NOCs, larger organizations were more likely to measure and assure their emissions, probably because their greater staff capacity and financial resources enable them to overcome the constraints described above. Size was not, however, associated with disclosure. In the corporate sector, larger organizations disclose partly because regulation requires them to do so[22], but this pressure does not yet apply to NOCs. The reasons why larger NOCs that measure their emissions do not disclose them more frequently warrant further investigation.

Assurance as a deferred step

The motives of the assuring NOCs are consistent with the view of assurance as a means of detecting errors and improving reporting processes[44,45], enhancing credibility46 and demonstrating commitment to sustainability[47]. However, five cases do not permit generalization.

The prominence of a lack of expertise is unsurprising, as the participating NOCs are still developing their measurement practices and assurance requires expertise in both emissions accounting and auditing[50]. Cost was the second barrier, consistent with the high cost of assurance for small organizations noted in the Introduction[48]. For NOCs that already pay external providers to measure their emissions, limited funds may remain for assurance, and the comments quoted above suggest that these NOCs regard assurance as a later stage in the development of their CA practices[52].

The choices made by the few assuring NOCs reflect the same concern with cost. Internal assurance avoids the fees charged by external providers[82]. Consultancy firms are generally less expensive than accountancy firms[42] and offer subject expertise[43], and limited assurance is both the most common and the least costly level of assurance[53]. It

therefore appears that the participating NOCs recognize the value of assurance but regard it as secondary to measurement while resources remain scarce.

Contributions and implications

Theoretically, the findings suggest that, in an unregulated non-profit field, informal coercive pressure from initiatives may substitute for regulation, supported by normative pressure from ethical and professional values. The findings also have several implications for practice:

- For the IOC: NOCs should be encouraged to join initiatives that carry specific reporting obligations, for example by linking Olympic Solidarity funding to initiative membership and evidence of CA practice.
- For standard setters and the Olympic Movement: a sector-specific CA standard for NOCs should be developed that addresses boundary setting, emission sources and data collection, as its absence is the principal barrier to in-house measurement.
- For NOCs: in-house expertise should be developed through partnerships with universities and training providers.

Limitations

This study has several limitations. The sample of 41 NOCs is modest, and some subgroups are very small, most notably the five NOCs that had obtained assurance and the seven that measured but did not disclose their emissions; findings for these groups should therefore be regarded as indicative. More generally, the findings describe the participating NOCs and should be extended to the wider population of NOCs with caution. Self-selection is the main concern: S4CA signatories, which were more likely to engage in all three practices, made up 61% of respondents but only about 35% of the NOCs contacted, in which case the prevalence of measurement, disclosure and assurance reported here overstates that among all NOCs. The comparison of early and late respondents cannot rule out this bias, since it assumes that late respondents resemble non-respondents. The data are self-reported, and the cross-sectional design does not permit causal inference. The survey was available only in English, which may account for the low participation of French-speaking African and Spanish-speaking South American NOCs: none of the eight African respondents was from a French-speaking country, and

only one NOC respondent was from a Spanish-speaking country (Table 1). Finally, the survey was distributed during the holiday period and shortly after the Paris 2024 Olympic Games, when many NOCs faced competing demands.

Conclusion

This study provides the first primary evidence on why NOCs engage in CA and what limits their engagement. Its main contribution is to show that, among the participating NOCs, the obligations attached to voluntary initiatives such as S4CA act as a substitute for regulation, while the capacity to respond is limited by the absence of a sector-specific standard, by staff constraints and by a lack of technical expertise. Pressure and capability therefore need to be addressed together: initiative membership creates the expectation that NOCs will account for their emissions, but a sector-specific standard and targeted training are needed before more NOCs can measure, disclose and assure their emissions in-house. Because the respondents may over-represent NOCs already engaged in sustainability, these conclusions apply to the participating NOCs and should be tested across the wider population.

Future research could explain why larger NOCs that measure their emissions do not disclose them more frequently. Larger samples of NOCs that obtain assurance, and of those that do not disclose their emissions, are needed to test the indicative findings reported here. Further organizational factors, such as financial position, number of athletes and geographical region, also merit investigation, and surveys offered in several languages and timed to avoid major Games would improve coverage. A follow-up survey of a sample of non-respondents would also allow non-response bias to be assessed directly.

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