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INGOLSTADT SCHOOL OF MANAGEMENT

Auswirkungen der Integration und Veröffentlichung von Nachhaltigkeitsaspekten auf Unternehmen

Kumulativen Dissertation zur Erlangung des akademischen Grads Doctor rerum politicarum

Lehrstuhl für ABWL und Unternehmensrechnung

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Überblick

Die vorliegende kumulative Dissertation untersucht, wie Nachhaltigkeitsaspekte in Unternehmen integriert, gemessen, berichtet und von externen Stakeholdern wahrgenommen werden. Im Mittelpunkt steht dabei die Frage, welchen Beitrag die systematische Erfassung und Veröffentlichung von Nachhaltigkeitsinformationen für Unternehmen leisten kann. Die Dissertation nähert sich dieser Fragestellung sowohl konzeptionell als auch empirisch.

Den Ausgangspunkt bildet Beitrag 1, der im Rahmen eines systematischen Literaturreviews den aktuellen Forschungsstand zur Integration von Environmental-, Social- und Governance-Faktoren (ESG) in unternehmerische Performance-Measurement-Systeme aufarbeitet. Der Beitrag identifiziert zentrale Entwicklungen, relevante ESG-Kennzahlen sowie bestehende Ansätze zur Messung und Steuerung nachhaltigkeitsbezogener Unternehmensleistung. Damit schafft er das konzeptionelle Fundament für die Frage, welche Nachhaltigkeitsaspekte in nachhaltige Performance-Measurement-Systeme integriert werden können und wie diese zur Verbesserung unternehmerischer Entscheidungs- und Steuerungsprozesse beitragen.

Beitrag 2 überträgt diese auf die Ebene der Unternehmenspraxis und fokussiert mit der sozialen Nachhaltigkeit eine häufig schwer zu operationalisierende ESG-Dimension. Anhand der Geschäfts- und Nachhaltigkeitsberichte der DAX40-Unternehmen wird untersucht, inwieweit öffentlich publizierte soziale Aktivitäten mit der Unternehmens- oder Nachhaltigkeitsstrategie nachvollziehbar verknüpft sind. Der Beitrag analysiert damit nicht nur, welche sozialen Aktivitäten Unternehmen berichten, sondern insbesondere, ob diese Aktivitäten als Bestandteil strategischer Zielsysteme erkennbar sind. Auf diese Weise wird sichtbar, in welchem Umfang soziale Nachhaltigkeit über reine Berichterstattung hinaus in die dokumentierte strategische Ausrichtung von Unternehmen eingebettet wird und wo weiterhin Handlungsbedarf für die Unternehmenspraxis besteht.

Während die ersten beiden Beiträge vor allem die Integration, Messung und strategische Verankerung von Nachhaltigkeitsaspekten betrachten, richtet Beitrag 3 den Blick auf die externe Wirkung veröffentlichter Nachhaltigkeitsinformationen. In einem experimentellen Forschungsdesign wird untersucht, ob numerische Sustainability Scores in Stellenanzeigen

die Arbeitgeberattraktivität beeinflussen und potenzielle Bewerberinnen und Bewerber zu relativen Lohnzugeständnissen bewegen. Der Beitrag liefert damit kausale Evidenz dafür, dass standardisiert kommunizierte Nachhaltigkeitsinformationen arbeitsmarktbezogene Entscheidungsprozesse beeinflussen können. Zugleich zeigt er, dass Nachhaltigkeitsinformationen nicht nur als regulatorisch motivierte Berichtsinhalte zu verstehen sind, sondern auch als strategisch relevante Signale gegenüber externen Stakeholdern wirken können.

Zusammengenommen spannt die Dissertation einen Bogen von der Identifikation und Integration relevanter Nachhaltigkeitsaspekte über deren strategische Verankerung und Berichterstattung bis hin zu ihrer Wirkung auf potenzielle Arbeitnehmer. Damit leistet sie einen Beitrag zum Verständnis der Auswirkungen von Nachhaltigkeitsintegration und Nachhaltigkeitsveröffentlichung auf Unternehmen.

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1. Problem- und Zielstellung

Der Begriff der Nachhaltigkeit hat in den vergangenen Jahrzehnten sowohl im akademischen Diskurs als auch in Politik, Wirtschaft und Gesellschaft erheblich an Bedeutung gewonnen.[1] Nachhaltigkeit beziehungsweise nachhaltige Entwicklung beschreibt dabei das Ziel, die Bedürfnisse der Gegenwart zu befriedigen, ohne die Möglichkeiten zukünftiger Generationen einzuschränken.[2] Zugleich verweist das Konzept darauf, ökologische Tragfähigkeit, soziale Gerechtigkeit und wirtschaftliche Effizienz gleichberechtigt zu berücksichtigen.[3]

Obwohl nachhaltigkeitsbezogene Überlegungen historisch deutlich älter sind als der heutige ESG-Begriff, hat sich insbesondere seit Beginn des 21. Jahrhunderts eine stärker kapitalmarkt- und unternehmensbezogene Perspektive auf Nachhaltigkeit etabliert.[4] Einen zentralen Bezugspunkt bildet der im Jahr 2004 veröffentlichte Bericht *Who Cares Wins: Connecting Financial Markets to a Changing World*, der die stärkere Berücksichtigung von Environmental-, Social- und Governance-Aspekten in Kapitalmärkten adressiert.[5] Seither hat sich ESG als Begrifflichkeit etabliert, um ökologische, soziale und unternehmensführungsbezogene Aspekte der Nachhaltigkeit systematisch zu erfassen und in unternehmerische Entscheidungs-, Steuerungs- und Berichtssysteme einzubinden.[6]

Die Relevanz von Nachhaltigkeitsinformationen hat sich durch regulatorische Entwicklungen seither weiter erhöht. Mit dem European Green Deal verfolgt die Europäische Union das Ziel, bis 2050 Klimaneutralität zu erreichen und den Übergang zu einer ressourcenschonenderen und nachhaltigeren Wirtschaft voranzutreiben.[7] In diesem Zusammenhang haben auch die Anforderungen an die Nachhaltigkeitsberichterstattung zugenommen.[8] Unternehmen, die unter die Corporate Sustainability Reporting Directive (CSRD) fallen, sind verpflichtet, nach den European Sustainability Reporting Standards zu berichten.[9] Mit der im März 2026 in Kraft getretenen Omnibus-I-Richtlinie wurde der

[1] Vgl. Elkington, 1994, S. 1
[2] Vgl. World Commission on Environment and Development, 1987, S. 43
[3] Vgl. Dyllick/Hockerts, 2002, S. 130 f
[4] Vgl. Renneboog/Ter Horst/Zhang, 2008, S. 1723
[5] Vgl. UN Global Compact, 2004
[6] Vgl. Maas/Schaltegger/Crutzen, 2016, S. 237 f
[7] Vgl. Europäische Kommission, 2026
[8] Vgl. Hummel/Jobst, 2024, S. 321
[9] Vgl. Europäisches Parlament, 2022, S. 26

Anwendungsbereich der CSRD jedoch eingeschränkt und eine Vereinfachung der ESRS beschlossen.[10] Dennoch sollen hierdurch Nachhaltigkeitsinformationen weiterhin zunehmend standardisiert erhoben, geprüft und veröffentlicht werden. Für Unternehmen bedeutet dies nicht nur zusätzliche Berichtspflichten, sondern auch die Notwendigkeit, Nachhaltigkeitsaspekte stärker in Steuerungs-, Mess- und Managementprozesse des externen Rechnungswesens zu integrieren.[11]

Aus betriebswirtschaftlicher Perspektive stellt sich daher nicht allein die Frage, wie Unternehmen regulatorische Berichtspflichten erfüllen. Vielmehr ist zu untersuchen, welche Nachhaltigkeitsaspekte für unternehmerische Performance-Measurement-Systeme relevant sind, wie diese Aspekte gemessen und strategisch verankert werden können und welche Wirkung veröffentlichte Nachhaltigkeitsinformationen auf externe Stakeholder entfalten. Die bisherige Forschung hat bereits Erkenntnisse zu Nachhaltigkeitsberichterstattung, Sustainable Performance Measurement und dem Zusammenhang zwischen ESG-Informationen und Unternehmensperformance hervorgebracht.[12] Gleichzeitig fehlt es bislang an Studien, die die Verbindung zwischen der internen Integration, der strategischen Verankerung und der externen Wirkung von Nachhaltigkeitsinformationen systematisch untersuchen.[13]

Diese Forschungslücke greift die vorliegende kumulative Dissertation auf. Sie untersucht die Auswirkungen der Integration und Veröffentlichung von Nachhaltigkeitsaspekte auf Unternehmen. Erstens wird analysiert, welche ESG-Faktoren in nachhaltige Performance-Measurement-Systeme integriert werden können und wie diese zur Messung und Steuerung nachhaltigkeitsbezogener Unternehmensleistung beitragen. Zweitens wird am Beispiel sozialer Nachhaltigkeit untersucht, inwieweit berichtete soziale Aktivitäten von Unternehmen öffentlich nachvollziehbar mit deren Unternehmens- oder Nachhaltigkeitsstrategien verknüpft sind. Drittens wird geprüft, ob veröffentlichte Nachhaltigkeitsinformationen in Form numerischer Sustainability Scores potenzielle Arbeitnehmer beeinflussen, insbesondere im Kontext der Arbeitgeberattraktivität und potenzieller Lohnzugeständnisse.

[10] Vgl Europäisches Parlament und Rat der Europäischen Union, 2026
[11] Vgl. Maas/Schaltegger/Crutzen,2016, S. 238
[12] Vgl. Hahn/Kühnen, 2013, S. 1 f
[13] Vgl. Johnson/Sutton/Theis, 2020, S. 55

Zur Bearbeitung dieser Forschungslücke verbindet die Dissertation komplementäre Perspektiven, wie es in Abbildung 1 übersichtlich dargestellt ist. Diese setzen sich aus einer fokussierten internen Perspektive, einer kombinierten internen und externen Perspektive sowie einer ausschließlichen externen Perspektive zusammen.

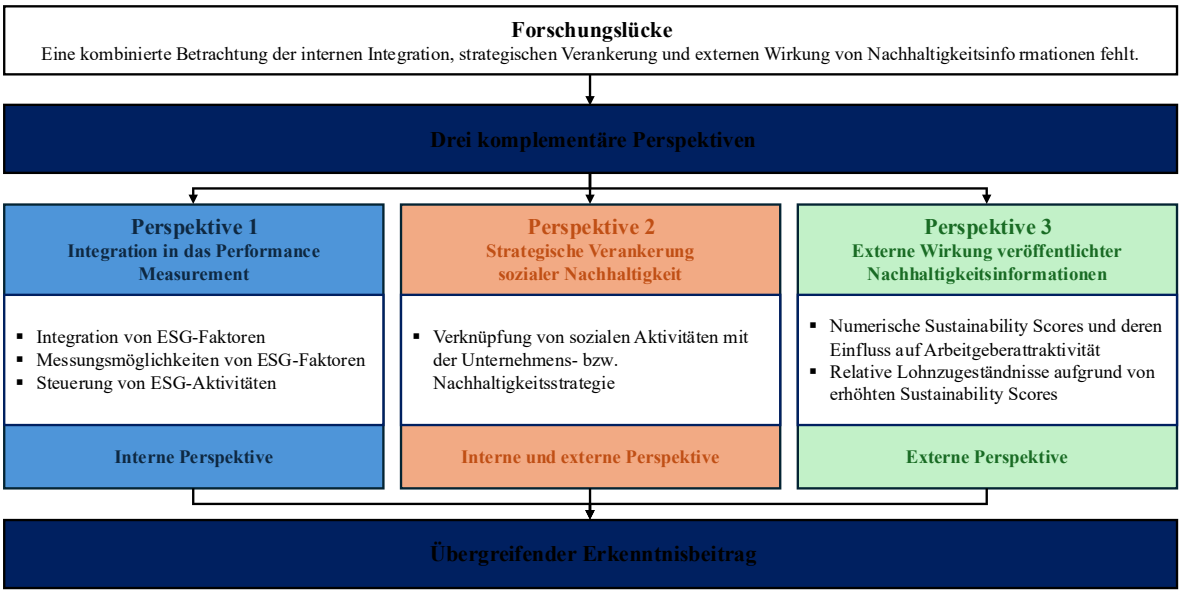


Abbildung 1: Überblick der Forschungslücke und deren Perspektiven (Eigene Darstellung)

Das Ziel der Dissertation besteht somit darin, einen Beitrag zum Verständnis der unternehmensbezogenen Auswirkungen von Nachhaltigkeitsintegration und Nachhaltigkeitsveröffentlichung zu leisten. Aus dieser Zielsetzung ergeben sich drei leitende Forschungsfragen:

- Welche ESG-Faktoren werden in der Forschung zu Sustainable Performance Measurement berücksichtigt, wie werden sie gemessen und welchen Beitrag können sie zur nachhaltigkeitsbezogenen Unternehmenssteuerung leisten?
- Inwieweit sind die von DAX40-Unternehmen berichteten sozialen Aktivitäten öffentlich nachvollziehbar mit deren Unternehmens- oder Nachhaltigkeitsstrategien verknüpft?
- Beeinflusst die Veröffentlichung numerischer Sustainability Scores in Stellenanzeigen die Arbeitgeberattraktivität und die Bereitschaft potenzieller Bewerberinnen und Bewerber zu relativen Lohnzugeständnissen?

Durch die Beantwortung dieser Forschungsfragen zeigt die Dissertation, dass Nachhaltigkeitsinformationen für Unternehmen nicht ausschließlich als Ergebnis

regulatorischer Berichtspflichten zu verstehen sind. Vielmehr können sie zugleich eine Grundlage für interne Steuerung, strategische Ausrichtung und externe Positionierung bilden. Die Dissertation leistet damit einen Beitrag zur betriebswirtschaftlichen Nachhaltigkeitsforschung, indem sie die Integration, strategische Verankerung und Wirkung von Nachhaltigkeitsinformationen in einem kumulativen Forschungszusammenhang verbindet.

2. Überblick zur kumulativen Dissertation

Im Mittelpunkt der kumulativen Dissertation steht nicht allein die Frage, wie Nachhaltigkeitsinformationen erhoben und berichtet werden können, sondern welchen unternehmensbezogenen Erkenntnis- und Anwendungsnutzen diese Informationen entfalten. Die Dissertation ist damit bewusst praxisnah ausgerichtet. Sie soll nicht ausschließlich einen Beitrag zur wissenschaftlichen Diskussion über Nachhaltigkeitsmessung und Nachhaltigkeitsberichterstattung leisten, sondern zugleich aufzeigen, welche Schlussfolgerungen sich für Unternehmen im Umgang mit Nachhaltigkeitsinformationen ableiten lassen.

Diese praxisnahe Ausrichtung zeigt sich in den drei Einzelbeiträgen der Dissertation. Der erste Beitrag hiervon schafft die Grundlage für die Dissertation, indem er den bestehenden Forschungsstand zur Integration und Messung von ESG-Faktoren in Performance-Measurement-Systeme strukturiert aufarbeitet. Der zweite Beitrag überträgt diese auf die unternehmensinterne sowie -externe Perspektive. Er untersucht den Zusammenhang zwischen den publizierten sozialen Aktivitäten und der Unternehmens- sowie Nachhaltigkeitsstrategie eines Unternehmens. Der dritte Beitrag erweitert die Dissertation um eine ausschließliche externe, wirkungsbezogene Perspektive. Während die ersten beiden Beiträge vor allem die Integration, Messung und strategische Verankerung von Nachhaltigkeitsaspekten betrachten, untersucht der dritte Beitrag, wie veröffentlichte Nachhaltigkeitsinformationen auf externe Stakeholder wirken.

Durch diese Einordnung wird deutlich, dass die drei Beiträge unterschiedliche, aber aufeinander bezogene Analyseebenen abdecken. Die Dissertation bewegt sich von der Erfassung und Messung von Nachhaltigkeitsaspekten über deren strategische Verankerung in der Unternehmenspraxis hin zur externen Wirkung veröffentlichter Nachhaltigkeitsinformationen. Damit entsteht ein kumulativer Zusammenhang, der die Integration und Veröffentlichung von Nachhaltigkeitsaspekten nicht nur als Berichts- oder Compliance-Thema versteht, sondern als unternehmensrelevanten Steuerungs-, Strategie- und Kommunikationszusammenhang.

Beitrag 1: A systematic literature review of performance measurement systems and the integration of ESG factors

Ausgangspunkt des Beitrags ist die zunehmende Bedeutung von Nachhaltigkeit für Unternehmen und die damit verbundene Herausforderung, ökologische, soziale und governancebezogene Aspekte nicht nur zu berichten, sondern in bestehende Performance-Measurement-Systeme zu integrieren. Klassische Performance-Measurement-Systeme sind häufig primär auf finanzielle oder operative Zielgrößen ausgerichtet und erfassen die Komplexität nachhaltigkeitsbezogener Unternehmensleistung unzureichend.[14] Vor diesem Hintergrund untersucht der Beitrag, wie ESG-Faktoren in Sustainable Performance Measurement Systems integriert werden können und welche Mess- und Steuerungsansätze die bisherige Forschung hierfür bereitstellt.

Die Grundidee des Beitrags besteht darin, den bestehenden Forschungsstand zu Sustainable Performance Measurement systematisch zu erfassen, zu strukturieren und kritisch auszuwerten. Damit adressiert der Beitrag ein Problem der Nachhaltigkeitsforschung. Die Literatur zu nachhaltigkeitsbezogener Performance-Messung ist inhaltlich breit, methodisch vielfältig und durch unterschiedliche theoretische Perspektiven, Branchenkontexte und Messansätze geprägt. Diese Vielfalt hat zwar zur Weiterentwicklung des Forschungsfeldes beigetragen, erschwert jedoch zugleich die Ableitung konsistenter Erkenntnisse für Wissenschaft und Unternehmenspraxis. Dabei bleibt erklärungsbedürftig, welche ESG-Faktoren für Unternehmen besonders relevant sind, wie diese gemessen werden können und inwiefern sie einen Beitrag zur langfristigen nachhaltigkeitsbezogenen Wertschöpfung leisten.

Die Forschungslücke des Beitrags liegt somit in der fehlenden systematischen Zusammenführung bestehender Erkenntnisse zur Integration von ESG-Faktoren in Performance-Measurement-Systeme. Zwar existieren bereits verschiedene Arbeiten zu Sustainable Performance Measurement, Sustainability Balanced Scorecards, Nachhaltigkeitsberichterstattung oder ESG-orientierten Bewertungsansätzen, dennoch fehlt eine umfassende und strukturierte Analyse, die den Forschungsstand zur Integration von ESG-Faktoren in unternehmerische Performance-Measurement-Systeme bündelt, zentrale

[14] Vgl. Grewal/Serafeim, 2020, S. 76

ESG-Dimensionen identifiziert und bestehende Mess- und Steuerungsansätze hinsichtlich ihres Beitrags zur Unternehmenspraxis einordnet. Vor diesem Hintergrund verfolgt der Beitrag drei Forschungsfragen:

1. Wie stellt sich der aktuelle Stand der Forschung zu Sustainable Performance Measurement dar?
2. Welche ESG-Faktoren können in ein Sustainable Performance Measurement System integriert werden, um den Informationsgehalt für Unternehmen zu maximieren und zugleich die Anzahl der erforderlichen Faktoren zu minimieren?
3. Wie können ESG-Faktoren gemessen werden, sodass sie zu Verbesserungen und zur langfristigen nachhaltigkeitsbezogenen Wertschöpfung von Unternehmen beitragen?

Das theoretische Konzept des Beitrags basiert auf der Verbindung von Sustainable Performance Measurement und ESG. Sustainable Performance Measurement wird dabei als Weiterentwicklung klassischer Performance-Measurement-Systeme verstanden, bei der nachhaltigkeitsbezogene Informationen systematisch erfasst, analysiert und für unternehmerische Entscheidungs- und Steuerungsprozesse nutzbar gemacht werden. Der Beitrag greift dabei die Triple-Bottom-Line-Perspektive sowie die ESG-Logik auf. Während die Triple Bottom Line ökologische, soziale und ökonomische Dimensionen nachhaltiger Unternehmensleistung betont,[15] erweitert die ESG-Perspektive diese Sichtweise um eine kapitalmarkt- und governancebezogene Strukturierung von Nachhaltigkeitsaspekten.[16] Theoretisch wird der Beitrag durch Stakeholder- und Legitimitätsperspektiven gerahmt, da Unternehmen Nachhaltigkeitsinformationen nicht nur zur internen Steuerung,[17] sondern auch zur Erfüllung externer Erwartungen[18] und zur Sicherung gesellschaftlicher Akzeptanz benötigen.[19]

Methodisch verwendet der Beitrag einen systematischen Literaturreview. Dieses Vorgehen ermöglicht eine transparente, nachvollziehbare und replizierbare Analyse des Forschungsfeldes. Die Untersuchung basiert auf 61 peer-reviewed Artikeln aus den

[15] Vgl. Gimenez/Sierra/Rodon, 2012, S. 157
[16] Vgl. Cantele/Landi/Vernizzi, 2024, S. 7384
[17] Vgl. Huret/Eccles, 2014, S. 1
[18] Vgl. Herreams/Nazari/Mahmoudian, 2016, S. 418
[19] Vgl. Schaltegger/Hörisch, 2017, S. 272

Datenbanken Web of Science und Business Source Ultimate. Die ausgewählten Studien werden entlang verschiedener Analysebereiche ausgewertet.

Die Ergebnisse des Beitrags zeigen einen Anstieg des wissenschaftlichen Interesses an Sustainable Performance Measurement im Zeitraum von 2004 bis 2024. Besonders stark nimmt die Anzahl der Veröffentlichungen in den jüngeren Untersuchungsperioden zu. Inhaltlich zeigt sich, dass viele Studien alle drei ESG-Dimensionen berücksichtigen, die ökologische Dimension jedoch besonders häufig im Mittelpunkt steht. Soziale Aspekte werden ebenfalls untersucht, etwa Arbeitsbedingungen, Diversität, Menschenrechte oder Stakeholder-Auswirkungen, sind jedoch in vielen Ansätzen weniger umfassend operationalisiert. Governancebezogene Aspekte erscheinen demgegenüber teilweise unterrepräsentiert oder weniger einheitlich in bestehende Messsysteme eingebunden.

Darüber hinaus verdeutlicht der Beitrag, dass die Forschung zu Sustainable Performance Measurement eine Vielzahl unterschiedlicher Instrumente und Konzepte entwickelt hat. Dazu zählen individuelle Frameworks, Decision Support Models und Composite Indexes. Diese Ansätze unterscheiden sich hinsichtlich ihrer theoretischen Fundierung, praktischen Anwendbarkeit, Kontextabhängigkeit und Standardisierung. Ein weiteres Ergebnis des Beitrags besteht daher darin, dass die Messung von ESG-Faktoren weiterhin fragmentiert ist und bestehende Ansätze nur begrenzt vergleichbar sind. Dies erschwert Unternehmen die Auswahl geeigneter Kennzahlen und die Integration von Nachhaltigkeitsaspekten in ein konsistentes Performance-Measurement-System.

Beitrag 2: Die sozialen Aktivitäten der DAX40-Unternehmen und die Konformität mit deren Unternehmensstrategien

Der zweite Beitrag überträgt die im ersten Beitrag angelegte Perspektive auf die aktuelle Unternehmenspraxis und fokussiert mit der sozialen Nachhaltigkeit eine spezifische Dimension des ESG-Konzepts. Während ökologische Nachhaltigkeit in der Unternehmenspraxis, der Forschung und der öffentlichen Diskussion bislang besonders im Vordergrund steht, gewinnen soziale Aspekte zunehmend an Aufmerksamkeit.[20] Soziale Aktivitäten können eine Vielzahl interner und externer Maßnahmen umfassen, etwa Arbeitsbedingungen, Gesundheitsschutz, Weiterbildung, Diversität, Gleichberechtigung,

[20] Vgl. Aguilera-Caracuel et al., 2026, S. 1760; vgl. Komp-Leukkunen/Levänen, 2026, S. 2

Menschenrechte, gesellschaftliches Engagement, Sponsoring oder Spenden.[21] Damit diese Aktivitäten jedoch nicht lediglich isolierte Einzelmaßnahmen darstellen, müssen sie systematisch geplant, umgesetzt, berichtet und mit strategischen Zielsetzungen verbunden werden.[22]

Der Beitrag untersucht, ob die von Unternehmen berichteten sozialen Aktivitäten öffentlich nachvollziehbar mit deren Unternehmens- oder Nachhaltigkeitsstrategie verknüpft sind. Der Beitrag betrachtet soziale Nachhaltigkeit somit nicht allein als Gegenstand der Berichterstattung, sondern als potenziellen Bestandteil strategischer Unternehmenssteuerung. Dabei wird analysiert, ob soziale Aktivitäten, die in Geschäfts- und Nachhaltigkeitsberichten veröffentlicht werden, als Ausdruck strategischer Zielsysteme erkennbar sind oder ob sie ohne erkennbare Verbindung zu den veröffentlichten Unternehmens- oder Nachhaltigkeitsstrategien berichtet werden.

Die Forschungslücke des Beitrags ergibt sich daraus, dass Unternehmen zwar zunehmend über soziale Aktivitäten berichten, die strategische Verankerung dieser Aktivitäten jedoch häufig unklar bleibt.[23] Die bloße Veröffentlichung sozialer Maßnahmen lässt noch nicht erkennen, ob diese Maßnahmen auf übergeordnete Unternehmensziele einzahlen, systematisch gesteuert werden oder Teil einer konsistenten Nachhaltigkeitsstrategie sind. Gerade für die Unternehmenspraxis ist diese Unterscheidung von Relevanz, da strategisch verankerte soziale Aktivitäten besser geplant, kontrolliert und hinsichtlich ihrer Zielerreichung bewertet werden können. Vor diesem Hintergrund verfolgt der Beitrag folgende Forschungsfrage:

- Sind die innerhalb des Jahresabschlusses publizierten sozialen Aktivitäten strategisch verankert?

Das theoretische Konzept des Beitrags basiert auf der Annahme, dass Unternehmensaktivitäten Ausdruck strategischer Ausrichtung sein sollten. Der strategische Planungsprozess beginnt mit der Definition eines Leitbildes und übergeordneter Ziele, auf deren Grundlage Strategien formuliert und operative Maßnahmen abgeleitet werden. Vor

[21] Vgl. Labuschagne/Brent/van Erck, 2005, S. 379
[22] Vgl. Labuschagne/Brent/van Erck, 2005, S. 377 f; vgl. Ardiansyah, 2024, S. 29
[23] Vgl. Vitolla/Rubino/Garzoni, 2017, S. 110 f

diesem Hintergrund können soziale Aktivitäten dann als strategisch verankert gelten, wenn sie mit den veröffentlichten Unternehmens- oder Nachhaltigkeitsstrategien übereinstimmen. Die Unternehmensstrategie fungiert dabei als Bindeglied zwischen Unternehmen, externem Umfeld und konkreten Aktivitäten. Eine Nachhaltigkeitsstrategie kann diese Funktion ergänzen, indem sie ökologische, soziale und ökonomische Zielsetzungen stärker ausdifferenziert und für die Unternehmenspraxis operationalisiert.

Methodisch basiert der Beitrag auf einer qualitativen Inhaltsanalyse nach Mayring. Untersucht werden die Geschäfts- und Nachhaltigkeitsberichte der DAX40-Unternehmen für das Geschäftsjahr 2023. Dabei werden die in den Berichten genannten sozialen Aktivitäten identifiziert, kategorisiert und anschließend mit den veröffentlichten Unternehmens- und Nachhaltigkeitsstrategien der jeweiligen Unternehmen abgeglichen.

Die Ergebnisse zeigen, dass die untersuchten DAX40-Unternehmen in ihren Geschäfts- und Nachhaltigkeitsberichten zum Geschäftsjahr 2023 insgesamt 1.286 soziale Aktivitäten berichten. Von diesen Aktivitäten lassen sich 111 Aktivitäten mit Zielen aus der Unternehmensstrategie begründen. Der größte Anteil entfällt auf Aktivitäten, die mit der Nachhaltigkeitsstrategie übereinstimmen. Insgesamt 605 Aktivitäten lassen sich dieser Kategorie zuordnen. Weitere 128 Aktivitäten weisen sowohl eine Übereinstimmung mit der Unternehmensstrategie als auch mit der Nachhaltigkeitsstrategie auf. Zugleich zeigt sich, dass ein erheblicher Teil der berichteten sozialen Aktivitäten nicht eindeutig mit den veröffentlichten Strategien verknüpft ist. Diese nicht-strategischen sozialen Aktivitäten machen 34 Prozent der berichteten Aktivitäten aus.

Die Ergebnisse verdeutlichen damit ein differenziertes Bild der sozialen Nachhaltigkeitspraxis kapitalmarktorientierter Unternehmen. Einerseits berichten die DAX40-Unternehmen in erheblichem Umfang über soziale Aktivitäten, was die praktische Relevanz sozialer Nachhaltigkeit unterstreicht. Andererseits zeigt die Analyse, dass nicht alle berichteten Aktivitäten öffentlich nachvollziehbar in strategische Zielsysteme eingebettet sind. Dies weist auf einen Handlungsbedarf für Unternehmen hin. Soziale Aktivitäten sollten nicht nur durchgeführt und berichtet, sondern stärker mit Unternehmens- oder Nachhaltigkeitsstrategien verknüpft werden. Eine solche Verknüpfung kann dazu beitragen, soziale Nachhaltigkeit besser zu steuern, Zielerreichung transparenter zu machen und die Legitimation gegenüber Stakeholdern zu stärken.

Beitrag 3: Sustainability Scores as Labor Market Signals: Experimental Evidence on Employer Attractiveness and Wage Concessions

Im Fokus des drittens Beitrags stehen potenzielle Bewerberinnen und Bewerber als arbeitsmarktbezogene Stakeholder von Unternehmen. Untersucht wird, ob numerische Sustainability Scores in Stellenanzeigen als Signale wirken, die die wahrgenommene Arbeitgeberattraktivität erhöhen und die Bereitschaft beeinflussen, zugunsten eines nachhaltigeren Arbeitgebers relative Lohnzugeständnisse zu akzeptieren.

Ausgangspunkt der Untersuchung ist die Beobachtung, dass Nachhaltigkeitsinformationen für Unternehmen zunehmend nicht nur regulatorische Relevanz besitzen, sondern auch potentielle Vorteile generieren, wie beispielsweise die Reduktion von Eigenkapitalkosten.[24] Die Erhebung, Prüfung und Veröffentlichung nachhaltigkeitsbezogener Informationen verursacht Unternehmen zwar zusätzliche Kosten.[25] Gleichzeitig eröffnet sich die Frage, ob diese Informationen über ihre Compliance-Funktion hinaus einen praktischen Nutzen entfalten. Der Recruiting-Kontext bietet hierfür ein relevantes Untersuchungsfeld, weil Bewerberinnen und Bewerber Arbeitgeberentscheidungen unter unvollständiger Information treffen und dabei auf sichtbare Signale über Werte, Verantwortungsbewusstsein und strategische Orientierung eines Unternehmens angewiesen sind.[26]

Trotz umfangreicher Forschung zu Corporate Social Responsibility und Arbeitgeberattraktivität bleibt bislang unzureichend geklärt, wie standardisierte, numerische Nachhaltigkeitsinformationen im frühen Bewerbungsprozess wirken. Frühere Studien zeigen hierzu, dass nachhaltigkeitsbezogene Unternehmensmerkmale die Arbeitgeberwahrnehmung beeinflussen können.[27] Unklar ist jedoch, ob bereits die bloße Präsenz eines Sustainability Scores eine Wirkung entfaltet oder ob vor allem dessen Höhe entscheidungsrelevant ist. Ebenso bedarf es weiterer Erkenntnisse darüber, welche ESG-Aspekte Bewerberinnen und Bewerber besonders stark gewichten und ob diese Präferenzen auch monetäre Trade-offs beeinflussen.

[24] Vgl. Dan et al., 2011, S. 94
[25] Vgl. Landau et al., 2020, S. 1760
[26] Vgl. Spence, 2002, S. 434 und S. 436; vgl. Judge/Cable, 1997, S. 389 f
[27] Vgl. Turban/Greening, 1997, S. 669; vgl. Jones/Willness/Madey, 2014, S. 399

Vor diesem Hintergrund verfolgt der Beitrag vier Forschungsfragen:

1. Beeinflusst die Präsenz eines Sustainability Scores das Arbeitgeberwahlverhalten und die Bereitschaft von Bewerberinnen und Bewerbern, niedrigere relative Löhne zu akzeptieren, im Vergleich zu vergleichbaren Stellenanzeigen ohne Sustainability Score?
2. Senkt ein höherer Sustainability Score die Gehaltsforderungen von Bewerberinnen und Bewerbern?
3. Welche ESG-Aspekte beeinflussen die Bereitschaft von Bewerberinnen und Bewerbern, zugunsten von Nachhaltigkeit auf Gehalt zu verzichten?
4. Welche Unterkriterien innerhalb der ESG-Aspekte priorisieren Bewerberinnen und Bewerber am stärksten?

Theoretisch stützt sich die Studie auf die Signaling Theory. Arbeitsmärkte sind durch Informationsasymmetrien geprägt, da zentrale Eigenschaften eines potenziellen Arbeitgebers, etwa Organisationskultur, ethische Standards, strategische Orientierung oder langfristige Ausrichtung, vor einer Bewerbung nur begrenzt beobachtbar sind.[28] Unternehmen können solche Informationsasymmetrien reduzieren, indem sie in Stellenanzeigen sichtbare und interpretierbare Signale senden.[29] Numerische Sustainability Scores werden in diesem Zusammenhang als Signale verstanden, die nachhaltigkeitsbezogene Unternehmensleistung bereits im frühen Recruiting-Prozess sichtbar machen und Bewerberinnen und Bewerbern zusätzliche Orientierung bei der Arbeitgeberbewertung geben.

Ergänzt wird diese theoretische Rahmung durch Konzepte der Arbeitgeberattraktivität sowie durch Überlegungen zum Verhältnis von Gehalt und Purpose. Arbeitgeberattraktivität beschreibt die wahrgenommene Attraktivität eines Unternehmens als potenzieller Arbeitgeber. Nachhaltigkeitsinformationen können diese Wahrnehmung beeinflussen, weil sie Hinweise auf organisationale Werte, gesellschaftliche Verantwortung und langfristige Orientierung geben.[30] Da Vergütung zugleich ein zentrales Entscheidungskriterium bei der Arbeitgeberwahl darstellt, untersucht die Studie nicht nur Attraktivitätswirkungen, sondern auch, ob Nachhaltigkeitsinformationen die Bereitschaft zu relativen Lohnzugeständnissen

[28] Vgl. Spence, 2002, S. 434
[29] Vgl. Ganesan/Antony/George, 2021, S. 145 f
[30] Vgl. Behrend/Baker/Thompson, 2009, S. 349

erhöhen. Dahinter steht die Annahme, dass Nachhaltigkeit für bestimmte Bewerberinnen und Bewerber einen eigenständigen Nutzen stiften kann, der monetäre Anreize teilweise kompensiert.

Zur empirischen Prüfung wird ein groß angelegtes Online-Experiment mit Forced-Choice-Design eingesetzt. Die Stichprobe umfasst 2.781 erwerbsfähige Erwachsene in Deutschland und generiert insgesamt 16.686 Arbeitgeberwahlentscheidungen. Die Teilnehmenden bewerten realistisch gestaltete Stellenanzeigen in Kontroll- und Treatment-Bedingungen. Während in der Kontrollbedingung kein Sustainability Score angezeigt wird, enthalten die Stellenanzeigen in der Treatment-Bedingung numerische Sustainability Scores. Dabei variiert sowohl die Präsenz als auch die Höhe beziehungsweise Differenz der Scores zwischen den Arbeitgeberalternativen.

Die empirischen Ergebnisse zeigen zunächst, dass bereits die Sichtbarkeit von Nachhaltigkeitsinformationen das Entscheidungsverhalten verändert. Werden Sustainability Scores in Stellenanzeigen angezeigt, sinkt der Anteil der Entscheidungen zugunsten der höher bezahlten Arbeitgeberalternative in der Treatment-Bedingung. Dies deutet darauf hin, dass Nachhaltigkeitsinformationen die relative Attraktivität eines Arbeitgebers erhöhen können, auch wenn dieser mit einem niedrigeren Gehaltsangebot verbunden ist.

Auch die Höhe der Sustainability Scores ist entscheidungsrelevant, allerdings in geringerem Ausmaß als deren bloße Präsenz. Innerhalb der Treatment-Bedingung gehen größere Unterschiede zwischen den Sustainability Scores konkurrierender Arbeitgeber mit höheren akzeptierten relativen Lohnzugeständnissen einher. Der Effekt zusätzlicher Score-Unterschiede fällt jedoch kleiner aus als der Effekt, der durch die Sichtbarkeit von Nachhaltigkeitsinformationen selbst entsteht. Für Unternehmen legt dieses Ergebnis nahe, dass die transparente Kommunikation standardisierter Nachhaltigkeitsinformationen im Recruiting bereits eine relevante Signalwirkung entfalten kann.

Ein differenziertes Bild ergibt sich bei der Rolle individueller ESG-Präferenzen. Diese beeinflussen zwar, wie Bewerberinnen und Bewerber Arbeitgeber bewerten, übersetzen sich jedoch nur begrenzt in stärkere monetäre Trade-offs. Umweltbezogene Präferenzen verstärken die Abkehr von der besser bezahlten Arbeitgeberalternative, sobald Sustainability Scores sichtbar sind. Governancebezogene Präferenzen schwächen diesen Effekt hingegen

ab. Die hohe subjektive Relevanz dieser Kriterien ist somit von ihrer Funktion als Moderator zu unterscheiden und steht nicht im Widerspruch zum zuvor festgestellten nicht signifikanten Moderationseffekt. Für die Beziehung zwischen Score-Differenzen und akzeptierten relativen Lohnzugeständnissen zeigen sich keine signifikanten Moderationseffekte der ESG-Präferenzen. Dies deutet darauf hin, dass Nachhaltigkeitspräferenzen eher die allgemeine Arbeitgeberbewertung als die monetäre Bewertung zusätzlicher Nachhaltigkeitsunterschiede prägen.

Aufschlussreich ist die Priorisierung einzelner ESG-Unterkriterien. Die Teilnehmenden messen sozialen Nachhaltigkeitsdimensionen die höchste Bedeutung bei, insbesondere Arbeitsbedingungen sowie Gesundheit und Sicherheit. Dies zeigt, dass die hohe subjektive Relevanz sozialer Kriterien trotz des zuvor festgestellten nicht signifikanten Moderationseffekts nicht unmittelbar in einen statistisch nachweisbaren Einfluss auf die Arbeitgeberwahl übergeht.

Daneben werden auch die Vergütung der Unternehmensleitung, die Vermeidung von Umweltverschmutzung und Transparenz als relevante Kriterien genannt. Insgesamt zeigt sich damit, dass Bewerberinnen und Bewerber vor allem solche Nachhaltigkeitsaspekte priorisieren, die arbeitsbezogen, unmittelbar beobachtbar oder persönlich relevant erscheinen. Abstraktere oder weiter entfernte Kriterien, etwa lokale Community-Aktivitäten oder umweltbezogene Anpassungsmaßnahmen, erhalten eine geringere Bedeutung.

3. Details zu den Veröffentlichungen

Beitrag 1: A systematic literature review of performance measurement systems and the integration of ESG factors

- Autorenschaft: Andreas Dauerer (Alleinautor)
- Präsentiert auf: 2nd International Conference on Sustainability, Entrepreneurship, Equity, and Digital Strategies (SEEDS-2024), 17.12.2024 - 18.12.2024
- Veröffentlichungsstand: Der Beitrag wurde am 1. September 2025 online im Journal *Environmental and Sustainability Indicators* [JIF: 5.6 und JCR: Q1], https://doi.org/10.1016/j.indic.2025.100746 veröffentlicht.

Beitrag 2: Die sozialen Aktivitäten der DAX40-Unternehmen und die Konformität mit deren Unternehmensstrategien

- Autorenschaft: Andreas Dauerer und Toni Thun

Bearbeitungsteile	**Andreas Dauerer**	**Toni Thun**
Literaturübersicht	100 %	0 %
Theorieentwicklung	100 %	0 %
Forschungsdesign	50 %	50 %
Datenerhebung	100 %	0 %
Datenanalyse	30 %	70 %
Interpretation der Ergebnisse	50 %	50 %
Schreibprozess	50 %	50 %
Insgesamt	**69 %**	**31 %**

Tabelle 1: Bearbeitungsanteile der Autoren von Beitrag 2.

- Präsentiert auf: International Conference on Humanities, Social Science and Business Management (ICHSSBM-2025), 02.12.2025 – 03.12.2025
- Veröffentlichungsstand: Der Beitrag wurde am 10.04.2026 in der Fachzeitschrift *KOR - Kapitalmarktorientierte Rechnungslegung* [VHB-Rating 2024: C]*, Heft 4*, 157 - 164. veröffentlicht.

Beitrag 3: Sustainability Scores as Labor Market Signals: Experimental Evidence on Employer Attractiveness and Wage Concessions

- Autorenschaft: Andreas Dauerer (Alleinautor)
- Präsentiert auf: 8th International Conference on Business, Economics and Management (ICBEM-2026), 25.05.2026 – 27.05.2026
- Veröffentlichungsstand: Der Beitrag befindet sich seit dem 10.07.2026 im Review-Prozess des Journals *Management Accounting Research* [VHB-Rating 2024: A].

4. Zusammenfassung

Die vorliegende kumulative Dissertation untersucht, welche Bedeutung die Integration und Veröffentlichung von Nachhaltigkeitsaspekten für Unternehmen besitzt. Ausgangspunkt ist die zunehmende Relevanz von ESG-Informationen für unternehmerische Steuerung, Berichterstattung und externe Kommunikation. Die Dissertation zeigt, dass Nachhaltigkeitsinformationen nicht allein als regulatorische Berichtsinhalte zu verstehen sind, sondern unter bestimmten Voraussetzungen eine unternehmensrelevante Steuerungs-, Strategie- und Signalfunktion übernehmen können.

Die drei Beiträge beleuchten diesen Zusammenhang aus komplementären Perspektiven. Der erste Beitrag zeigt auf Basis eines systematischen Literaturreviews, dass ESG-Faktoren grundsätzlich in Sustainable Performance Measurement Systems integrierbar sind, die Forschung jedoch weiterhin durch heterogene Messansätze, unterschiedliche Konzepte und begrenzte Vergleichbarkeit geprägt ist. Der zweite Beitrag verdeutlicht am Beispiel der DAX40-Unternehmen, dass soziale Aktivitäten zwar umfangreich berichtet werden, ihre öffentlich nachvollziehbare Verknüpfung mit Unternehmens- oder Nachhaltigkeitsstrategien jedoch unterschiedlich ausgeprägt ist. Der dritte Beitrag liefert experimentelle Evidenz dafür, dass veröffentlichte Sustainability Scores in Stellenanzeigen externe Stakeholderentscheidungen beeinflussen können, indem sie relative Lohnzugeständnisse begünstigen.

Für die Unternehmenspraxis folgt daraus, dass Nachhaltigkeitsinformationen nicht lediglich als Pflichtbestandteil der Berichterstattung behandelt werden sollten. Vielmehr sollten Unternehmen ESG-Faktoren systematisch auswählen, konsistent messen, mit strategischen Zielsetzungen verknüpfen und zielgerichtet kommunizieren. Dadurch können Nachhaltigkeitsinformationen nicht nur Transparenz schaffen, sondern auch zur internen Steuerung und externen Positionierung des Unternehmens beitragen.

Gleichzeitig verdeutlicht die Dissertation weiteren Forschungsbedarf. Zukünftige Studien könnten untersuchen, wie Unternehmen Nachhaltigkeitsinformationen intern tatsächlich in Entscheidungsprozesse einbinden, wie unterschiedliche Stakeholdergruppen auf verschiedene Formen der Nachhaltigkeitskommunikation reagieren und welche langfristigen ökonomischen Effekte sich aus der strategischen Nutzung von

Nachhaltigkeitsinformationen ergeben. Zudem bleibt zu analysieren, wie standardisierte Berichtsanforderungen, unternehmensspezifische Nachhaltigkeitsstrategien und externe Stakeholderreaktionen langfristig zusammenspielen.

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Beitrag 1

A Systematic Literature Review of Performance Measurement Systems and the integration of ESG factors

Abstract

This Systematic Literature Review (SLR) investigates the integration of Environmental, Social, and Governance (ESG) factors into corporate Performance Measurement Systems. Based on an analysis of 61 peer-reviewed articles from the Web of Science and Business Source Ultimate databases, the review addresses three central research questions: (1) What is the current state of the literature on Sustainable Performance Measurement? (2) Which ESG factors can be integrated into a Sustainable Performance Measurement System for companies to maximize information output while minimizing the number of required factors? (3) How can ESG factors be measured to contribute to improvements and long-term sustainability value creation for corporations?

The analysis reveals a marked and sustained rise in scholarly attention to Sustainable Performance Measurement between 2004 and 2024, with the number of publications more than doubling between the periods 2014–2017 and 2018–2021. While most studies consider all three ESG dimensions, environmental factors receive the most attention—frequently alongside governance and, to a lesser extent, social aspects such as working conditions, diversity, and stakeholder impact.

This review synthesizes major developments in the field, including the design of individual frameworks, decision support models, and composite indexes for ESG performance assessment. It identifies the most relevant ESG components for inclusion in PMSs and critically evaluates how these factors are currently measured, offering insights into their practical contribution to corporate performance improvement.

1. Introduction

In an era characterized by increasing environmental awareness and societal accountability, businesses are facing heightened expectations to adopt sustainable practices. This shift reflects not only the global urgency to address climate change and social inequities but also the growing recognition of sustainability as a driver of long-term corporate success. Performance Measurement Systems (PMSs) have emerged as vital tools for organizations to align their strategies with these sustainability goals. By integrating ESG factors into PMS frameworks, companies can evaluate their impact holistically and develop actionable insights for improvement. However, as sustainability gains prominence, it has become clear that traditional PMS models often fall short in capturing the complexities and interdependencies of ESG dimensions and therefore Sustainable Performance Measurement Systems (SPMS) were developed.

The existing body of literature on Sustainable Performance Measurement (SPM) has explored a wide range of research questions, drawing from diverse theoretical foundations, employing varied methodologies, and addressing a multitude of organizational and industrial contexts. While this diversity has enriched the field, it also presents significant challenges. The broad scope of approaches makes it difficult to distill consistent themes and extract actionable insights. Notably, much of the literature grounds its understanding of SPM in distinct conceptual frameworks, such as the Triple-Bottom-Line (TBL) approach, which emphasizes the integration of environmental, social, and economic dimensions of performance. The broad scope of approaches makes it difficult to distill consistent themes and extract actionable insights. As the significance of sustainability continues to grow, the integration of ESG factors into performance measurement systems has become increasingly vital. In addition to established frameworks such as the TBL, the ESG perspective is gaining prominence as a pragmatic and investor-oriented approach that enables organizations to align sustainability performance with emerging regulatory demands and stakeholder expectations. ESG dimensions encompass critical areas that influence both corporate operations and long-term viability. Environmental aspects, such as resource use and emissions, reflect an organization's commitment to minimizing its ecological footprint. Social factors, including labor practices, community engagement, and diversity, shape a company's social responsibility and its relationships with stakeholders. Governance factors

ensure transparency, accountability, and ethical management. The need to integrate these diverse but interconnected elements into PMS frameworks is clear, as traditional models often fail to comprehensively assess their impact. This integration not only aids in achieving sustainability goals but also contributes to enhancing corporate resilience and long-term performance. Consequently, there is a pressing need for research that offers systematic approaches to incorporate ESG factors into PMSs, aligning corporate performance with broader societal and environmental objectives.

Furthermore, the fragmented nature of the research complicates the identification of overarching trends and critical gaps, leaving scholars and practitioners without a clear roadmap for advancing the integration of ESG factors into SPMSs. This lack of coherence underscores the need for a systematic review that synthesizes the existing knowledge, identifies gaps, and sets the stage for future research in this rapidly evolving domain.

Based on a systematic review of the literature, this study synthesizes core systems and findings, identifies essential ESG factors for integration into SPMSs. A comprehensive search was conducted in leading academic journals to identify all relevant studies on SPM. Each article is classified along key dimensions, including research methods, concepts, performance field and industries, data origin and the specific ESG factors addressed. This classification enables the identification of common themes, areas of divergence, and gaps in the current knowledge base. Finally, the managerial implications across the reviewed studies are synthesized, highlighting areas of consensus, disagreement, and emerging opportunities for further research. This synthesis not only provides clarity on the current state of the field but also outlines a roadmap for advancing the integration of ESG factors into SPMS.

This research offers significant contributions to both academia and practice. It provides a comprehensive synthesis of the existing literature on SPM, highlighting critical gaps and opportunities for future research. By identifying effective methods for measuring ESG factors and aligning them with corporate objectives, this study serves as a valuable resource for practitioners seeking to enhance their sustainability strategies. Additionally, it lays the groundwork for advancing SPMS frameworks that balance ESG considerations, ultimately supporting organizations in achieving sustainable success.

2. Conceptual background

2.1 Sustainable Performance Measurement

Over the past decades, sustainability has evolved from a peripheral concern into a central element of corporate strategy and governance. In response to growing societal, environmental, and regulatory pressures, organizations have increasingly recognized the need to embed sustainability into their core performance measurement logic (Elkington, 1994; Epstein and Roy, 2001; Ansari and Kant, 2017). This development has catalysed a substantial body of research around SPM, which is generally understood as the systematic process of capturing, analysing, and communicating sustainability-related information to support internal decision-making and stakeholder accountability (Maas et al., 2016; Searcy, 2012).

The conceptual foundation of most SPM approaches lies in the TBL framework, which advocates for a balanced assessment of environmental, social, and economic dimensions of performance (Elkington, 1998). The TBL framework remains a dominant lens through which sustainability is operationalized in corporate performance systems (Morioka and Carvalho, 2016; Pryshlakivsky and Searcy, 2017). However, recent scholarship has pointed to the limitations of traditional TBL-based approaches, particularly their tendency to treat the three dimensions in isolation rather than as interrelated and dynamic (Schaltegger and Burritt, 2005; Carvalho, 2017). In response, newer contributions have advocated for integrative approaches that incorporate broader dimensions such as psychological or institutional sustainability (Carvalho and Sousa, 2018) or emphasize stronger links between sustainability performance and corporate social responsibility (Ashrafi et al., 2018).

In organizational practice, sustainability performance data is frequently collected for the purposes of sustainability reporting. However, its utility extends far beyond external communication. When embedded into strategic planning and operational control, sustainability indicators serve as critical tools to guide decision-making, enhance resource allocation, and align corporate activities with long-term sustainable value creation (Hörisch et al., 2014; Maas et al., 2016). Notably, SPM systems are increasingly expected to meet the expectations of a diverse range of stakeholders, including investors, regulators, employees, and civil society actors (Parmar et al., 2010; Steurer et al., 2005).

Despite the proliferation of research on SPM (Epstein and Widener, 2010; Gadenne et al., 2012; Nappi and Rozenfeld, 2015), consensus around a unified definition or methodological standard remains elusive. Challenges persist regarding the contextualization of metrics (Schaltegger and Burritt, 2010), the integration of trade-offs across dimensions (Pollesch and Dale, 2015), and the development of adaptive systems that evolve alongside shifting sustainability priorities (Boiral and Gendron, 2011). These tensions reflect a broader shift in sustainability thinking away from static, compliance-driven models toward dynamic systems that support strategic transformation and continuous learning.

SPM is therefore more than a reporting mechanism. Tt is a strategic capability. As sustainability becomes a central driver of competitive advantage and legitimacy, companies are called upon to build SPM systems that are forward-looking, stakeholder-oriented, and adaptable. These systems must not only monitor outcomes but actively support managerial decisions that lead to long-term value creation across various sustainable spheres.

2.2 ESG factors

The integration of ESG factors into this SPMSs has become increasingly critical for understanding corporate sustainability. Theories of sustainability, such as agency theory, stakeholder theory, legitimacy theory, signaling theory, and institutional theory, collectively emphasize the necessity for corporations to adopt ESG principles to maintain long-term viability and societal approval. For this study, stakeholder and legitimacy theories provide theoretical foundation, guiding the analysis of how ESG factors influence sustainable performance outcomes.

Stakeholder theory posits that corporations must address the interests of all stakeholders, not just shareholders, to achieve sustainability. This involves balancing organizational objectives with social and environmental responsibilities. Research has demonstrated that effective stakeholder engagement, driven by robust ESG practices, can enhance employee engagement and drive sustainability performance (Flammer and Kacperczyk, 2019). A firm’s ability to innovate and implement strategic measures that minimize negative environmental impacts is essential for maintaining a competitive advantage (Porter and Kramer, 2011). The system of enlightened value maximization further underscores the importance of aligning business practices with the broader interests of all affected

stakeholders, ultimately fostering long-term value creation (Jensen, 2002). Legitimacy theory complements this perspective by suggesting that a corporation's social license to operate is contingent upon its adherence to societal norms, values, and expectations. Companies gain legitimacy through ESG practices that demonstrate their commitment to social and environmental well-being. By engaging in transparent ESG reporting and adhering to socially accepted practices, firms can enhance their reputation and foster public trust (Suchman, 1995). This compliance is not merely a symbolic gesture; it serves as a strategic necessity to secure stakeholder support and ensure organizational resilience in the face of evolving societal expectations.

The ESG framework evaluates a firm's performance across all three pillars. The environmental dimension focuses on a company's efforts to minimize resource use and emissions, while the social dimension addresses human rights, employee welfare, and community relations. Governance, in turn, evaluates the management structures and practices that ensure corporate accountability and ethical conduct. Despite the critical role of ESG factors, inconsistencies in their measurement persist. ESG scores often suffer from comparability issues, as they are based on non-financial attributes and self-reported data, leading to potential biases and limited standardization across firms and regions (Malik, 2015).

There are several established frameworks that incorporate specific ESG factors to assess and manage sustainability performance in organizations. Esty and Cort (2017) outline various ESG and sustainability metrics from different sources, each focusing on distinct dimensions and factors. For instance, MSCI's Sustainable Impact Metrics evaluate six social themes, including nutrition, disease treatment, and sanitation, alongside five environmental themes such as alternate energy and pollution prevention (MSCI, 2016a). The MSCI ESG Fund provides metrics across three dimensions: sustainable impact, values alignment (ensuring investments align with ethical or political values), and risk assessment related to ESG factors (MSCI 2016b). The MSCI ESG Rating includes an extensive set of 80 exposure metrics and 129 management metrics, covering business segment and geographic risks alongside ESG-related policies and programs (MSCI 2016c). MSCI's Carbon Solutions offers detailed data on fossil fuel reserves, carbon emissions, and sector-specific applications, critical for assessing environmental risks associated with carbon-intensive industries (MSCI 2016b).

Bloomberg's ESG Disclosure Scores provide over 120 ESG factors aligned with the Global Reporting Initiative's performance factors (Bloomberg 2016). Similarly, Thomson Reuters' ESG Data includes over 70 key performance factors categorized under environmental (e.g., resource use, emissions), social (e.g., workforce, human rights), and governance dimensions (e.g., management practices, shareholder engagement) (Thomson Reuters 2018).

These frameworks illustrate the diversity in existing ESG metrics, reflecting various approaches to evaluating corporate sustainability through comprehensive and standardized ESG factors (Esty und Cort, 2017). Empirical studies have yielded mixed findings regarding the impact of ESG practices on financial performance. For instance, Deswanto and Siregar (2018) found that environmental disclosures did not significantly affect firm performance in the Indonesian market, whereas Kalia and Aggarwal (2023) observed positive effects in healthcare firms within developed economies but inconclusive results in emerging markets. These discrepancies highlight the complexities of linking ESG practices to corporate outcomes and the influence of regional and industry-specific factors. Moreover, research by Habib and Mourad (2023) during the COVID-19 crisis revealed that advanced ESG practices contributed positively to firm performance, underscoring the potential resilience that ESG initiatives can provide in times of economic uncertainty.

Controversies surrounding ESG factors further complicate their impact on firm performance. Studies have shown that ESG controversies can adversely affect market valuations and investor perceptions (Ting et al., 2020). However, some research paradoxically indicates that controversies may signal transparency and accountability, thus attracting investor interest (Aouadi and Marsat, 2018). The implications of such controversies underscore the need for proactive and strategic ESG management to mitigate risks and uphold organizational credibility (DasGupta, 2022).

2.3 ESG factors and enterprise performance measurement

In recent years, the evolving concept of ESG has attracted significant attention regarding its influence on corporate performance. Most researchers contend that high ESG ratings correlate positively with improved enterprise performance, suggesting that robust ESG practices can enhance overall corporate success (Khan et al., 2018a; Wang and Jiang, 2021; Lv et al., 2021). However, a few studies offer a contrasting view, proposing that ESG

performance may have a negative impact on firm outcomes, especially in specific sectors or under certain conditions (Garcia et al., 2017).

As ESG metrics prioritize non-financial aspects such as environmental stewardship, social responsibility, and governance structures, they provide a comprehensive framework to assess an enterprise's sustainable development alongside traditional financial metrics. This integration allows for a more holistic performance evaluation, combining both financial and non-financial factors to better gauge a company's long-term viability and commitment to sustainable practices (Zhang, 2020; Tan, 2021). Consequently, an increasing body of research has begun incorporating ESG factors into corporate performance evaluation models, aiming to align strategic business objectives with sustainability goals (Wang and Huang, 2020).

Nevertheless, there remain notable gaps in the literature, particularly concerning industry-specific applications of ESG-driven performance evaluation frameworks. In the following chapter, a review of prior literature will be conducted to determine if comprehensive SLRs exist that address this study’s specific focus. This examination will clarify the current research landscape and highlight areas where further investigation is needed, setting a foundation for the contributions of this work.

3. Prior Reviews

Before collecting data and conducting the review on SPM, existing SLRs on the topic were examined to ensure the novelty, relevance, and contribution of the present study (Snyder, 2019). To support this objective, the Web of Science and Business Source Ultimate databases (via EBSCOhost) were consulted. An extended search term was employed to capture all relevant literature, accounting for variations in the different terminologies:

TI=("literature review" OR "systematic review") AND TI=("performance measurement" OR "performance evaluation*" OR "performance assessment*" OR "performance management*" OR PMS) AND TS=(Sustainab* OR ecolog*OR environment* OR social OR green)*

Of all 83 (WOS: 37; EBESCOhost: 46) identified SLRs, 19 duplicate files were identified and removed. The remaining 64 were fully read and all irrelevant ones were removed. Thus, the 8 most relevant SLRs relevant to the scope of this paper were identified and listed in Table 1.

Table 1. Overview of existing SLRs.

Authors	Title	Period	Sources
Dvořáková and Stříteská (2023)	Shortcomings of Current Performance Measurement and Management Systems: A Literature Review	2003 - 2023	25
Mio et al. (2022)	Performance measurement tools for sustainable business: A systematic literature review on the sustainability balanced scorecard use	2000 - 2020	65
Hristov et al. (2021)	The role of the environmental dimension in the performance management system: A systematic review and conceptual framework	2002 - 2020	71
Rojas-Lema et al. (2021)	Performance measurement in SMEs: systematic literature review and research directions	2006 - 2019	131
Farias et al. (2019)	Criteria and practices for lean and green performance assessment: Systematic review and conceptual framework	1996 - 2018	18
Büyüközkan and Karabulut (2018)	Sustainability performance evaluation: Literature review and future directions	2007 - 2018	128
Star et al. (2016)	Performance Measurement and Performance Indicators: A Literature Review and a Proposed Model for Practical Adoption	1988 - 2007	25
Klovienė and Speziale (2015)	Sustainability Reporting as a Challenge for Performance Measurement: Literature Review	2000 - 2014	52

In their study, Klovienė and Speziale (2014) explore how integrating PMSs with sustainability reporting enhances decision-making by incorporating ecological and social factors into planning and reporting processes. A systematic analysis by Hristov et al. (2021) develops a model for strategically integrating environmental considerations into corporate

management but highlights the gap between theoretical frameworks and practical applications.

Focusing on current PMS weaknesses, Dvořáková and Stříteská (2023) identify that technical and social control mechanisms frequently fail, leading to ineffective outcomes and adverse employee behavior. A model presented by Star et al. (2016) aims to support the implementation of PMS, demonstrating how these systems can improve organizational capabilities while fostering internal learning processes.

Mio et al. (2022) examine corporate responsibility in environmental assessments, concluding that despite the increasing use of environmental factors in PMS, practical challenges persist. Rojas-Lema et al. (2021) focus on performance measurement in SMEs, identifying a lack of resources and strategic misalignment as key barriers to implementing comprehensive systems.

Farias et al. (2019) examine the relationship between Lean and Green Manufacturing in a SLR. They propose a framework to assess operational and environmental performance through integrated practices, identifying key performance criteria and their interrelations. Building on the topic of integrated performance measurement, Rojas-Lema et al. (2021) analyze performance measurement in SMEs. Their review highlights a research gap: while most studies focus on individual firms, networks and supply chains remain largely overlooked.

Adopting a broader perspective, Büyüközkan and Karabulut (2018) review sustainability performance evaluation (SPE). They emphasize the need for balanced models, well-defined criteria, and strategies to reduce subjectivity through group decision-making and analytical methods. SPE is defined as the quantification of an organization’s economic, social, and environmental performance.

Extending the discussion, Star et al. (2016) review performance measurement and its implementation. They present a model to support the development of PMSs, emphasizing their role in enhancing organizational capabilities and internal learning. The study also provides guidance on selecting and developing performance indicators, with a focus on communication and systematic decision-making.

Considering the existing body of literature, there is a clear need for a study that offers a comprehensive review and systematic assessment of SPMSs. Such a study has the potential to uncover valuable insights overlooked in previous research, with significant practical implications for businesses and society, while also guiding future research endeavors (Thomé et al, 2016).

Furthermore, the present study is therefore to answer the following research questions:

1. What is the current state of the literature on SPM?
2. Which ESG factors can be integrated into a SPMS for companies to maximize information output while minimizing the number of required factors?
3. How can ESG factors be measured to contribute to improvements and long-term sustainability value creation for corporations?

4. Research Design

4.1 Research Methodology

To present a comprehensive overview of the current state of SPM and to address the research questions, the SLR methodology was employed. This approach ensures a structured and transparent examination of the selected research area (Denyer and Tranfield, 2009, Rousseau et al., 2008, Tranfield et al., 2003). As defined by Denyer and Tranfield (2009), an SLR is a methodology that identifies, evaluates, and synthesizes existing studies to report evidence in a way that enables clear conclusions about what is known and what is not. Unlike traditional literature reviews, an SLR follows a scientifically rigorous, detailed, transparent, and replicable process. This ensures the generation of reliable, high-quality findings, highlights gaps in the literature, and fosters the development of future research directions (Alvarez Jaramillo et al., 2019; Denyer and Tranfield, 2009; Sivarajah et al., 2017; Tranfield et al., 2003).

In accordance with the phases outlined by Tranfield et al. (2003) and Sivarajah et al. (2017), the SLR conducted followed the steps outlined below:

1. Planning: Defining the research objectives and developing the review protocol (Section 4.2).
2. Searching and selecting: Identifying and collecting relevant studies to build the final sample (Section 4.3).
3. Analysis: Analyzing the selected articles to address the research questions (Section 5 and 6).
4. Dissemination: Proposing avenues for future research (Section 7).

4.2 Planning

The aim of this SLR is to thoroughly and critically examine the research questions outlined in the previous section. The focus is on understanding the developments in the field of SPMS, reflecting on the current state of research, and identifying future directions to further advance the discourse in this area.

To address the first research question, a detailed analysis was conducted of each study to gain a comprehensive understanding of current literature and its state of the art. This analysis involved examining the research method, the industry relevant to each study, and the origin of the datasets (country). Additionally, the specific area of the company addressed by each study (e.g., supply chain, manufacturing) was analyzed, and the outcomes or tools developed (e.g., frameworks, indices) were identified. This thorough analysis was essential in providing a detailed overview of the current research landscape, while also helping to identify existing gaps and potential avenues for future research.

To address the second research question, an in-depth analysis was conducted of the ESG aspects covered in the reviewed articles. Special attention was given to the Key Performance Indicators (KPIs) and recommendations highlighted in each study. This approach provided valuable insights into the ESG factors addressed and assessed, offering an overview of the relevant factors.

To answer the third and final research question, all articles were analyzed with regard to their contributions to companies in the measurement of ESG-related information. This analysis aimed to evaluate how the research supports organizations in addressing the implications for sustainable business practices.

4.3 Searching and selecting

To identify and collect relevant publications in the field of SPM, a systematic procedure recommended and applied in prior SLRs was followed (e.g., Rodrigues and Ensslin, 2023).

The database used was Web of Science. These databases are recognized for the academic quality of their content and provide advanced search options, ensuring a robust and efficient collection of relevant literature. As noted by Birkle et al. (2020), the platform supports a wide range of research activities through its extensive journal coverage, complete citation linkages, and enhanced metadata, making it an invaluable resource for SLRs by ensuring the inclusion of high-impact and relevant studies.

For the selection of articles suitable for this study, the following criteria were applied:

- Articles published between 1994 and June 11, 2024, up until 3:00 PM (time of search) were included.
- The Social Sciences Citation Index was used as the primary database.
- To maintain consistency and practicality, only articles written in English were considered.
- Both empirical studies, employing quantitative, qualitative, or mixed-methods analyses, as well as conceptual papers, were included to provide a broad perspective.

Keywords relevant to SPMSs and sustainability were used in the search strategy (see Figure 1), with keyword inspiration drawn from Klovienė and Speziale (2014).

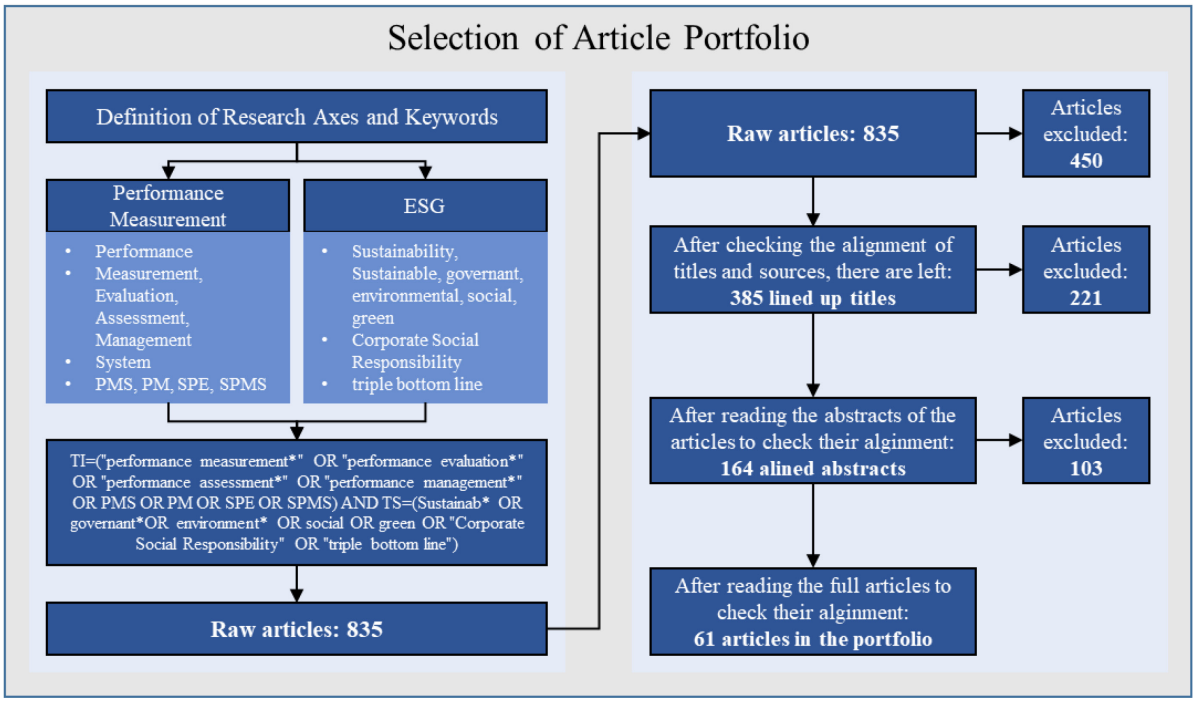


Fig. 1. Selection process of the article portfolio.

The initial search resulted in 835 hits. After examining their titles and source, 450 Studies were excluded and 385 Titles were left over. Studies that did not pertain to corporate PMSs were excluded based on their titles and the journals in which they were published. For example, research on sustainable human psychology, sustainable production processes in material management, and sustainable operational methods in healthcare were excluded for this reason.

In the next step, a cursory analysis of 385 abstracts was conducted. A total of 221 articles were excluded based on predefined inclusion criteria, which are as follows:

- The article focusses on organizations or corporations
- The focus of the paper contributes to ESG factors
- The article concentrates on the contributions to performance measurement, evaluation, assessment or management

This resulted into 164 articles. As the final step, the full texts of the remaining articles were read in-depth, and articles which did not address the research objectives were excluded. As a result of this process, a final sample of 61 articles was obtained.

5. Descriptive analysis of development and characteristics

5.1 Frequency and methodology

Figure 2 illustrates a marked and sustained increase in academic interest in SPM over the period of 2008 until 2023. Notably, from 2014 onward, the volume of publications more than doubled between the 2014-2017 and 2018–2021 intervals, by a significant rise in 2019. However, following this period of growth, the volume of publications has remained relatively constant, indicating a stabilization in academic output. This finding aligns with the trends observed by Akomea-Frimpong et al. (2022) which attribute the surge in publications to the introduction of the United Nations Sustainable Development Goals (SDGs) in 2015.

Quantitative research dominates the field across most years, particularly evident in 2019 where 6 out of 11 studies were quantitative. From 2014 onward, quantitative methods consistently represent a significant portion of the research, indicating a preference for data-driven analysis in sustainability performance measurement. Qualitative research is almost ervey year prominent, particularly in 2019 and 2022, where qualitative studies contribute 5 out of 11 and 3 out of 6 total studies, respectively. The use of mixed methods (combining both qualitative and quantitative approaches) is less frequent overall.

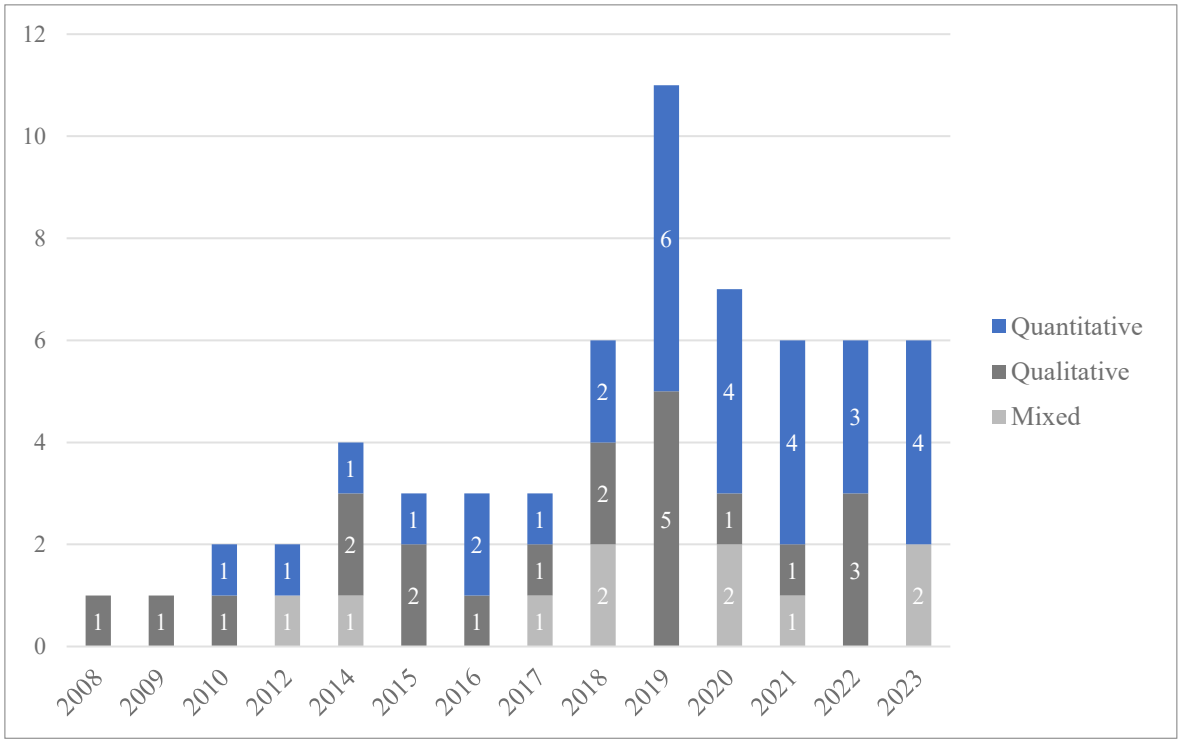


Fig. 2. Frequency and methodology of studies.

A significant portion of the relevant literature on SPM is published in a concentrated set of journals, as shown in Figure 3.The most prominent contributions are found in the journal *Sustainability* and the *Journal of Cleaner Production*, accounting for 14 and 11 articles. These journals align closely with the fields of environmental management and sustainable production. Other notable contributions come from interdisciplinary journals such as *Corporate Social Responsibility and Environmental Management* and *Production Planning & Control*, each with 3 publications. Interestingly, the remaining journals, such as *Sustainable Production and Consumption* and *Human Resource Management Review*, contribute fewer articles, generally indicating a more specialized focus. The variety of journals suggests that, while sustainability research is deeply embedded in management and production disciplines, it also spans across accounting, supply chain, and interdisciplinary sciences.

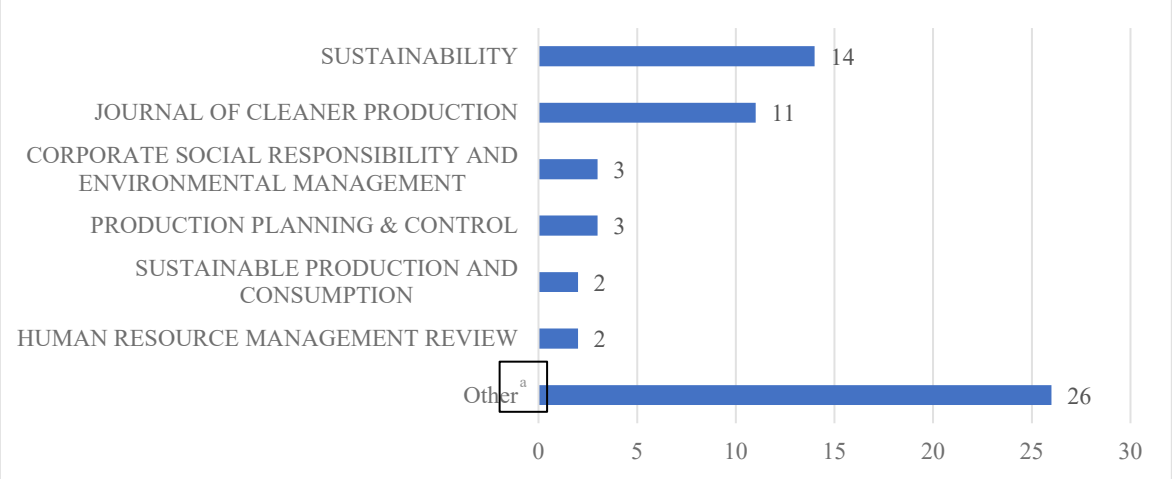


Fig. 3. Distribution of pubished journals.
[a]Journals with only 1 contribution each

In the following Table 2 the top five publications by annual citations are shown, sorted by size. Two of the articles were published in the *Journal of Cleaner Production* and *Computers & Industrial Engineering* 2-ABS ranked Journals. The articles of Moldavska and Welo (2019), with the most annual citations (19,33), and Adivar et al. (2019), with 16,67 annual citations, are published in a not ranked journal. Bhattacharya et al. (2014) article is published in the *Production Planning & Control,* a 3-ABS ranked Journal.

Table 2. Best cited studies.

Authors	Annual Citations	Source
Moldavska and Welo (2019)	19,33	Journal of Manufacturing Systems
Chardine-Baumann and Botta-Genoulaz (2014)	19,09	Computers & Industrial Engineering
Bhattacharya et al. (2014)	18,18	Production Planning & Control
Giannakis et al. (2020)	17,6	Journal of Cleaner Production
Adivar et al. (2019)	16,67	Journal of Retailing and Consumer Services

Table 3 represents the industries from which data and information were sourced for the studies. The manufacturing industry is the most frequently studied sector, with 6 studies (9.84% of the total), particularly from 2014 onwards. This reflects the growing interest in sustainability and performance measurement in manufacturing, possibly due to its direct impact on resource consumption and environmental degradation (Ali et al., 2021). Studies that involve multiple industries, under the "Different" category, account for the largest portion (15 studies, 24.59 %). The growth in multi-industry studies is noticeable, particularly after 2018, suggesting a shift toward a more holistic approach in research, where sustainability practices and performance measurement are examined across various sectors (Ordonez-Ponce et al., 2021). This trend indicates that sustainability issues are becoming cross-industry concerns, which aligns with the interdisciplinary nature of sustainable development goals (Alfirević et al., 2023). The Table 3 shows also that in recent years (2020–2023) a consistent focus on various industries, including Automotive, Agricultural, Public Organization and Oil and Gas exists. The increased presence of Oil and Gas and Automotive industries from 2018 onward is linked to the energy transition and growing research interest in reducing carbon footprints and enhancing sustainability in traditionally high-impact sectors (Alagoz and Alghawi, 2023).

Table 3. Distribution of industry focus.

Industry	2008	2009	2010	2012	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Manufacturing					1			1		3				1	**6**	**9,84**
Automotive			1						1	2					**4**	**6,56**
Agricultural											2		1		**3**	**4,92**
Service		1					1		1						**3**	**4,92**
Banking								1	1						**2**	**3,28**
Mining												1	1		**2**	**3,28**
Public Organization									1			1			**2**	**3,28**
Recycling				1			1								**2**	**3,28**
Oil and Gas					1								1		**2**	**3,28**
Different[b]					1	1	1		2	1	4	2	1	2	**15**	**24,59**
Other[c]				1		1				3	1	1		2	**9**	**14,75**
NA[d]	1		1		1	1		1		2		1	2	1	**11**	**18,03**
Total	**1**	**1**	**2**	**2**	**4**	**3**	**3**	**3**	**6**	**11**	**7**	**6**	**6**	**6**	**61**	**100,00**

[b] Several industries involved
[c] Industries with only one contribution each
[d] No industry specified

Table 4 provides a breakdown of the continents, from which data in various studies originated. The examination shows that Europe and Asia contribute the largest share of data sources, representing 42.62% and 27.87% of the studies, respectively. Europe's dominance is noticeable particularly from 2016 onward, which coincides with heightened regulations and initiatives in sustainability and performance measurement across the continent, driven by frameworks such as the European Green Deal. Similarly, the significant contribution of Asia, which gained prominence in sustainability research after 2015, is linked to the rapid industrialization in countries like China and India and the parallel focus on environmental sustainability (Zhao et al., 2024). Studies that use data from multiple continents, have been shown in 2014, 2018 and especially in 2020. This highlights a growing trend toward more globally oriented research, reflecting the interconnected nature of sustainability issues and the necessity of cross-border collaboration to address global challenges like climate change.

Table 4. Distribution of region.

Continent	2008	2009	2010	2012	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total	%
Europe		1	1	2	1	2	1	2	3	6	2	3	1	1	**26**	**42,62**
Asia			1		1		2	1	2	1	1	2	2	4	**17**	**27,87**
North America										2		1			**3**	**4,92**
Different[e]					1				1		2				**4**	**6,56**
Na[f]										1			2	1	**4**	**6,56**
None[g]	1				1	1				1	2		1		**7**	**11,48**
Total	**1**	**1**	**2**	**2**	**4**	**3**	**3**	**3**	**6**	**11**	**7**	**6**	**6**	**6**	**61**	**100,00**

[e] Several continents involved
[f] Origin of the data was not specified
[g] Indicates studies that did not use data at all

5.2 Concepts

ESG-based concepts have made significant progress since 2008, as seen in Table 5, Figure 4 and 5, driven not only by the introduction of new factors but also by their comprehensive approach, which includes sector-specific and industry-wide applications. These concepts encompass frameworks, composite indexes, decision support models, and hybrid combinations thereof. They establish what constitutes effective sustainability performance, aid in the selection of appropriate factors, and set clear expectations for measurement outcomes. Certain concepts have been extended for use in sustainability reporting, particularly in addressing qualitative factors that are analytically challenging to integrate.

Table 5. Overview of concepts and performance fields.

Author	Concept	Performance Field
Alam und Tariq (2023)	Empirical Model	Overall
Asiaei et al. (2023)	Framework	Overall
Cagno et al. (2023)	Framework	Overall
Fatima and Elbanna (2023)	Framework	Overall
Kao (2023)	Framework	Overall
Zhang et al. (2023)	Empirical Model	Supply Chain
Aman and Seuring (2022)	No Concept	Supply Chain
De Carvalho et al. (2022)	Framework	Supply Chain
Hao et al. (2022)	Empirical Model	Overall
Olugu et al. (2022)	Framework	Overall
Qureshi (2022)	Framework	Supply Chain
RezaHoseini et al. (2022)	Decision Support Model	Project Management
Dey et al. (2021)	Framework	Supply Chain
Ma et al. (2021)	Framework	Overall
Madison and Schiedhll (2021)	No Concept	Overall
Ramos et al. (2021)	Framework	Overall
Taušl Procházková et al. (2021)	Framework	Overall
Zhao et al. (2021)	Framework	Overall
Addison et al. (2020)	Framework	Overall
Gharizadeh Beiragh et al. (2020)	Framework	Overall
Giannakis et al. (2020)	Decision Support Model	Supply Chain
Grecu et al. (2020)	Composite Index	Overall
Malesios et al. (2020)	Empirical Model	Supply Chain
Pham et al. (2020)	Framework	Overall
Rafiaani et al. (2020)	Framework	Overall
Adivar et al. (2019)	Framework	Supply Chain
Cagno et al. (2019)	Framework	Overall
Fechete and Nedelcu (2019)	Empirical Model	Manufactoring

Author	Concept	Performance Field
Persdotter Isaksson et al. (2019)	Framework	Supply Chain
Küçükbay and Sürücü (2019)	Framework	Overall
Kühnen and Hahn (2019)	No Concept	Manufactoring
Moldavska and Welo (2019)	Theoretical Model	Manufactoring
Pislaru et al. (2019)	Empirical Model	Overall
San Ong et al. (2019)	Empirical Model	Overall
Tseng and Levy (2019)	Framework	HR Management
Wicher et al. (2019)	Framework	Overall
Aras et al. (2018)	Empirical Model	Overall
Coutinho et al. (2018)	No Concept	Overall
Deng et al. (2018)	Framework	Overall
Khan et al. (2018b)	Decision Support Model	Supply Chain
Nigri and Del Baldo (2018)	No Concept	Overall
Tundys and Wisniewski (2018)	Framework	Supply Chain
Beheshtinia and Omidi (2017)	Framework	Overall
Bergmann et al. (2017)	Framework	Overall
Rajnoha et al. (2017)	Framework	Overall
Dong et al. (2016)	Decision Support Model	Overall
Motevali Haghighi et al. (2016)	Framework	Supply Chain
Nudurupati et al. (2016)	No Concept	Overall
Arena et al. (2015)	Framework	Overall
Lisi (2015)	No Concept	Overall
Pádua and Jabbour (2015)	Framework	Business Processes
Bhattacharya et al. (2014)	Framework	Supply Chain
Caniato et al. (2012)	Framework	Supply Chain
Chardine-Baumann and Botta-Genoulaz (2014)	Framework	Supply Chain
Rabbani et al. (2014)	Empirical Model	Overall
Björklund et al. (2012)	Framework	Supply Chain
Zhou et al. (2012)	Composite Index	Overall
Hsu and Liu (2010)	Framework	Overall
Ramos and Caeiro (2010)	Framework	Overall
Lundberg et al. (2009)	Framework	Overall
Ferris et al. (2008)	Framework	HR Management

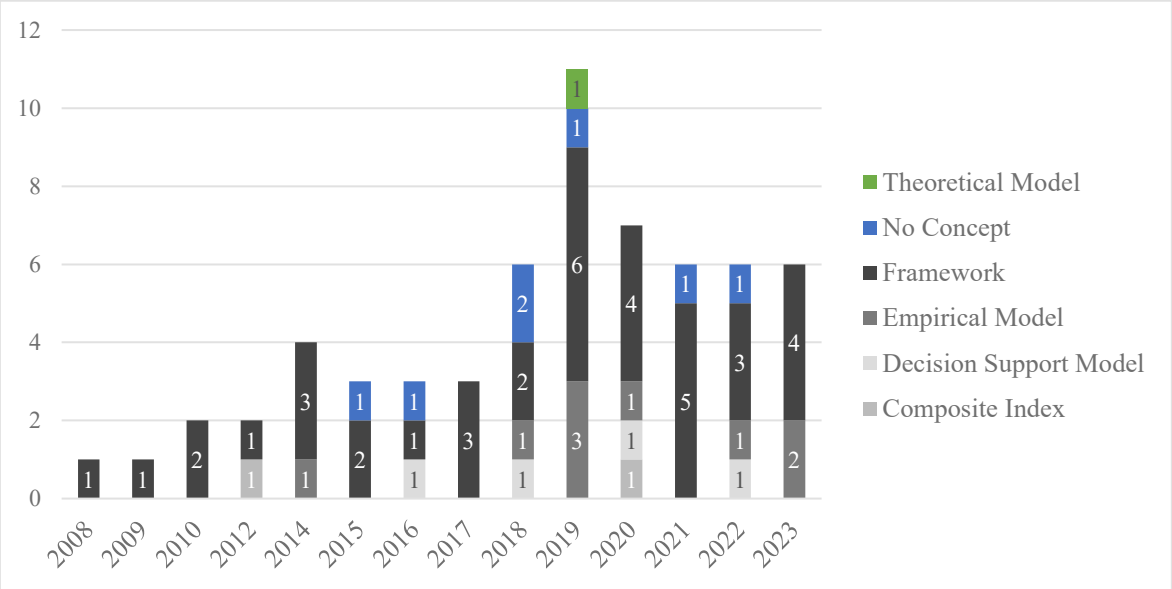


Fig. 4. Frequency of concepts

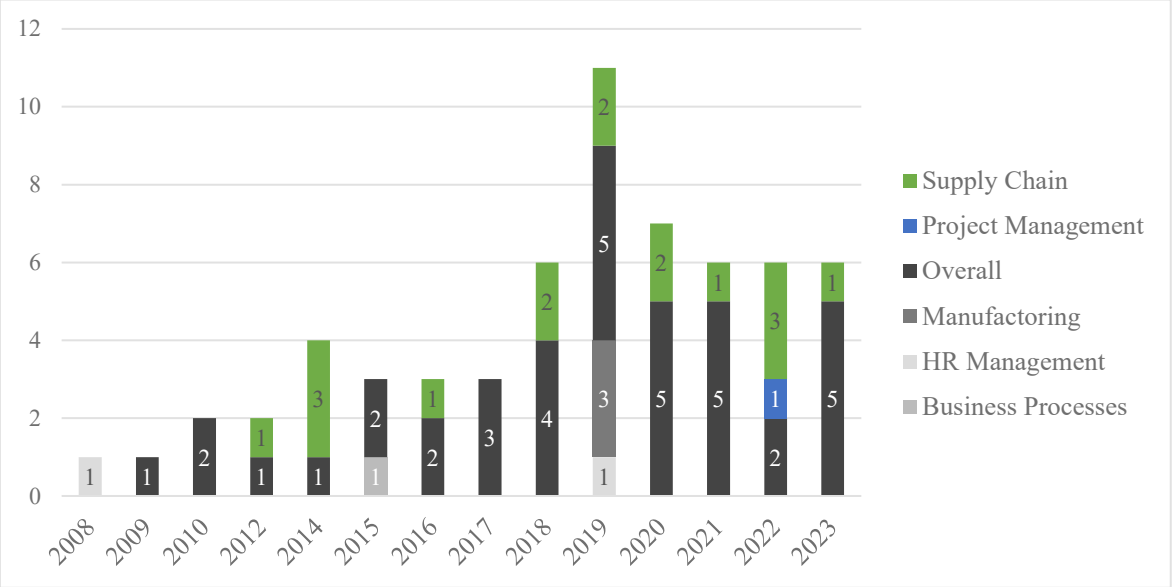


Fig. 5. Frequency of performance field.

Frameworks

Conceptual frameworks for SPM have significantly diversified in recent years, each offering unique insights into industry-specific applications, multi-dimensional assessments, and innovative methodologies. Asiaei et al. (2023), for instance, develop a framework that combines Simons' levers of control with resource orchestration theory, enabling alignment between Corporate Social Responsibility (CSR) and organizational performance through balanced PMSs.

A number of frameworks have emerged with a strong focus on supply chains. De Carvalho et al. (2022) offer a roadmap specifically for the agri-food supply chain, structured around the Triple Bottom Line (TBL) to address sector-specific sustainability demands. Similarly, Qureshi (2022) introduces a framework centered on enabling sustainable supply chain performance management systems (SCPMS) through interpretive structural modeling. Björklund et al. (2012) advance this focus by emphasizing environmental management through performance metrics for reverse logistics within supply chains, while Caniato et al. (2012) and Chardine-Baumann and Botta-Genoulaz (2014) target sustainable practices within supply chain management. Expanding on these approaches, Dey et al. (2021) integrate structural equation modeling with data envelopment analysis in a framework tailored for SMEs, addressing the unique constraints of resource-limited firms. Persdotter Isaksson et al. (2019) propose an environmentally sustainable logistics framework that fosters process integration between buyers and third-party logistics providers, ensuring alignment with environmental goals. Addressing the needs of omnichannel retail, Adivar et al. (2019) introduce a framework that organizes performance metrics around sustainability, efficiency, responsiveness, and flexibility to support comprehensive retail operations.

Several supply chain-oriented frameworks leverage the Balanced Scorecard (BSC) as a foundation, adapting it to meet specific environmental and operational demands. However, the traditional BSC lacks environmental indicators and provides limited applicability at the operational level (Kurien and Qureshi, 2012). Zhao et al. (2021) apply the BSC within the logistics sector to assess green performance at ports, incorporating fuzzy decision-making to address inherent uncertainties. Likewise, Bhattacharya et al. (2014) creates a green BSC using fuzzy ANP tailored to green supply chains, facilitating environmental and social decision-making. Tundys and Wisniewski (2018) extend the BSC's application in Poland's green supply chains by integrating Life Cycle Assessment (LCA) for a comprehensive approach to environmental performance. Haghighi et al. (2016) merge the BSC with DEA in a hybrid model tailored for recycling supply chains, offering a multi-dimensional evaluation method to enhance sustainability.

With distinct applications but similarly grounded in the BSC, Deng et al. (2018) develop a hybrid multi-criteria decision-making (MCDM) framework for sustainability performance specifically for CPA firms. In the hospitality sector, Fatima and Elbanna (2023) introduce a

health-inclusive sustainability BSC to address health and safety imperatives post-pandemic. For the automobile industry, Hsu and Liu (2010) construct a BSC-based framework that incorporates environmental strategies, tailored to align with sectoral sustainability requirements.

Many frameworks combine the TBL approach with other evaluative models to create comprehensive tools that enhance sustainability practices across various sectors (e.g., Ma et al., 2021; Taušl Procházková et al., 2021; Cagno et al., 2019; Wicher et al., 2019).

At the corporate level, sustainability frameworks are extending into advanced quantitative methods. Küçükbay and Sürücü (2019) introduce a Multimoora Sort model to categorize corporate sustainability performance with structured economic, social, and environmental evaluations, while Tseng and Levy (2019) emphasize a multilevel leadership approach that enhances performance management through relational dynamics within organizational settings.

Other frameworks are tailored to specific sectors. For public organizations, Bergmann et al. (2017) propose a model focused on resource efficiency, while Beheshtinia and Omidi (2017) develop a MCDM framework for evaluating sustainability within the banking sector. Addressing Taiwan's industrial parks, Kao (2023) introduces an ESG-based model that combines fuzzy Delphi and DEA to support the nation's 2050 net-zero objectives. In industrial environments, Cagno et al. (2023) present a scalable framework that merges Sustainability, Circular Economy, and Industrial Symbiosis to support ecological transitions across organizational levels. Recognizing the rising importance of biodiversity conservation, Addison et al. (2020) propose a biodiversity-centered framework for corporate performance, while Pham et al. (2020) offer an environmental performance model for manufacturing that utilizes simulation for resource optimization. Pádua and Jabbour (2015) advance the alignment of sustainability and operational goals through a pentagon model focused on business process integration. The framework by Ferris et al. (2008) shifts traditional evaluation to a relational context, centering on social, emotional, cognitive, political, and relational factors. Lundberg et al. (2009) adapt the Pressure-State-Response model with Management-by-Objectives for Sweden's rail system, integrating environmental goals with operational mandates.

Public sector frameworks contribute distinct approaches to sustainability assessment. Ramos and Caeiro (2010) propose a meta-evaluation system for sustainability factors, ensuring alignment with policy objectives. Building on this, Ramos et al. (2021) co-create a framework for Portuguese public organizations that integrates stakeholder values, aiming to optimize policy and sustainability outcomes. The framework by Arena et al. (2015) is specifically designed for social enterprises, balancing social, environmental, and economic performance to meet the unique needs of these organizations.

Challenges in achieving comprehensive sustainability assessments persist, with recent frameworks addressing such complexities through MCDM methods. Gharizadeh Beiragh et al. (2020) and Olugu et al. (2022) integrate AHP and DEA to enable context-specific evaluations in fields such as insurance and offshore oil. social life cycle analysis is highlighted by Rafiaani et al. (2020), who present a framework assessing social impacts in the algae production industry, a key player in carbon capture and utilization technologies.

Decision support Models

Recent developments in Decision Support Models (DSMs) underscore a growing commitment to sustainability-oriented performance evaluations across various business domains. Khan et al. (2018b) and Giannakis et al. (2020) focus on sustainable supplier selection, each employing distinct MCDM frameworks to incorporate environmental, economic, and social dimensions. Khan et al. (2018b) utilize Fuzzy Shannon Entropy and Fuzzy Inference Systems to prioritize sustainability criteria for manufacturing supply chains, allowing firms to align supplier practices with corporate sustainability values. Giannakis et al. (2020) employ the Analytic Network Process, which highlights interdependencies among sustainability metrics, thus enhancing strategic supplier evaluations.

Dong et al. (2016) extend the DSM application to Demand Side Management for commercial enterprises in China, where a hybrid fuzzy AHP-TOPSIS model evaluates DSM performance. This model incorporates economic, social, environmental, and technical criteria to help organizations optimize energy use and contribute to resource conservation goals. Similarly, RezaHoseini et al. (2022) propose a Z-Number-based AHP-DEA hybrid model for sustainable project selection in portfolio management. By ranking projects based

on sustainability-weighted criteria, this model aids project-based organizations in aligning portfolios with sustainability objectives amidst uncertainty.

Composite Indexes

Further advancing the role of composite indices in SPM, Grecu et al. (2020) developed the Global Sustainability Index (CSI) to offer a holistic assessment of an organization's sustainability performance across economic, environmental, and social dimensions. Designed for wide applicability, this index simplifies the sustainability assessment process, enabling organizations to monitor progress and make strategic sustainability decisions. In a similar vein, Zhou et al. (2012) constructed a composite sustainability index specifically for the manufacturing sector. By focusing on environmental, social, and economic factors, this index provides a tailored assessment framework for industries needing continuous sustainability tracking, such as brewing. Rajnoha et al. (2017) created a composite index of sustainable development for evaluating the sustainability practices of a Slovak manufacturing enterprise. This index, grounded in economic, social, and environmental metrics, was designed to identify how sustainability actions correlate with financial performance, specifically ROE, providing insight into the balance between sustainability initiatives and profitability.

Empirical and theoretical model

Building on the foundational role of empirical models, Alam and Tariq (2023) introduce a CSI tailored to non-financial firms in Pakistan. This model assesses sustainability disclosure using both quality and level metrics, integrating GRI and context-specific factors. Another model developed by Zhang et al. (2023) identifies pivotal factors, such as profit growth rate, service satisfaction, and green consensus that collectively drive Green Supply Chain performance. Hao et al. (2022) introduce an innovative performance evaluation framework that extends its utility beyond the initial industry context, offering substantial contributions to both scholarly discourse and practical implementation. In a related vein, Malesios et al. (2020) present an empirical tool tailored for SMEs and policymakers, enabling objective measurement and benchmarking of sustainability performance, and strategically informing supply chain enhancements. San Ong et al. (2019) advance a Structural Equation Model underpinned by contingency theory, elucidating how contextual variables shape SPM

practices. Pisllaru et al. (2019) apply a fuzzy model to articulate the influence of Corporate Environmental and Financial Performance on corporate sustainability, providing a nuanced, quantitative depiction of their interrelations. Fechete and Nedelcu (2019) propose a comprehensive framework for optimizing manufacturing systems, aligning production processes with sustainability imperatives to identify inefficiencies, minimize waste, and promote resource efficiency, all contributing to sustainable development. In the banking sector, Aras et al. (2018) devise a rigorous empirical model for evaluating corporate sustainability performance within emerging markets, enabling banks to monitor and improve their strategic outcomes. Additionally, Rabbani et al. (2014) introduce an integrated model for assessing the sustainable performance of oil-producing firms, providing a balanced framework that incorporates both financial and non-financial criteria to inform strategic decision-making and operational improvements.

Moldavska and Welo (2019) theoretical model seeks to holistically evaluate a manufacturing company's sustainability performance, linking corporate sustainability to global sustainability goals. The model focuses on assessing sustainability as a dynamic process of directed change rather than as a static state.

6. Content Analysis

6.1 ESG factors for performance measurement

To address the second research question, it was necessary to analyze the factors mentioned and discussed in the reviewed literature. The analysis revealed a significant variation in the number of proposed factors for sustainability performance measurement, which presents notable challenges. One key issue is the risk of overwhelming companies and thereby hindering the adoption of sustainable practices. Given the multifaceted nature of sustainability, a comprehensive set of factors is required to adequately capture its complexity (Garengo et al., 2005). However, there is growing consensus in the literature that an effective framework must strike a balance between depth and breadth. While a higher number of factors can provide detailed insights, overly extensive frameworks risk becoming cumbersome and counterproductive for practical application (Cagno et al., 2019; Medini et al., 2015).

To address these challenges, a streamlined yet informative set of factors is recommended. Nonetheless, literature has yet to converge on a definitive threshold for the number of factors in such systems. Existing recommendations vary widely, with some studies suggesting between 5 and 60 factors (Collins et al., 2016), while empirical applications propose ranges from 20 to 70 factors, contingent on the specific industrial context (Saeed and Kersten, 2020).

Previous studies emphasize that a framework for measuring sustainability performance should be both manageable and practical, while simultaneously guiding firms toward enhanced sustainability outcomes (Cagno et al., 2019). For companies with limited awareness, resources, and competencies, frameworks with a concise set of factors are particularly beneficial as they enable efficient and effective performance measurement. Ideally, these frameworks should also be scalable to accommodate a firm's varying stages of resource availability, awareness, and competency throughout its sustainable transformation (Neri et al., 2021).

Given the multidimensional nature of sustainability, PMSs must adopt a comprehensive perspective. Frameworks in the literature typically include factors spanning economic and

productivity-related aspects, environmental dimensions, and social and institutional considerations. However, nearly a third of the reviewed studies fail to propose a clear categorization of their factors, leading to significant heterogeneity and a lack of practical guidance for decision-makers (Cagno et al., 2019). The most common categorization framework is based on the traditional or modified TBL (e.g. Ma et al., 2021; Taušl Procházková et al., 2021; Cagno et al., 2019), while other studies propose unique approaches (e.g. Asiaei et al., 2023; Deng et al., 2018). The inconsistency in categorization schemes presents challenges for organizations, particularly those with limited competencies, to effectively utilize these frameworks.

Designing categories that are intuitive and easy to understand is critical, especially for firms at the beginning of their sustainability journey. Nevertheless, the strict assignment of factors to a single category can be problematic due to overlapping dimensions of sustainability. Factors that span multiple categories, addressing, for instance, both environmental and economic aspects, can provide better insights and greater informational value for resource-constrained firms (Neri et al., 2021).

A key categorization approach follows the ESG dimensions, as proposed by the United Nations Global Compact (2004). However, the analysis of 58 studies that include sustainability factors reveals an imbalance in their focus: 56 studies address environmental factors, 47 consider social factors, and only 24 include governance factors (as seen in Figure 6). Furthermore, 22 studies comprehensively address all three ESG factors. A total of 24 studies focusses on both environmental and social aspects, while 9 studies exclusively consider environmental factors. Governance and social dimensions are each addressed exclusively in only one study, highlighting a significant gap in their individual representation. This imbalance mirrors findings in prior literature, which emphasizes the predominance of environmental metrics while economic and, especially, social aspects remain underrepresented (Negri et al., 2023).

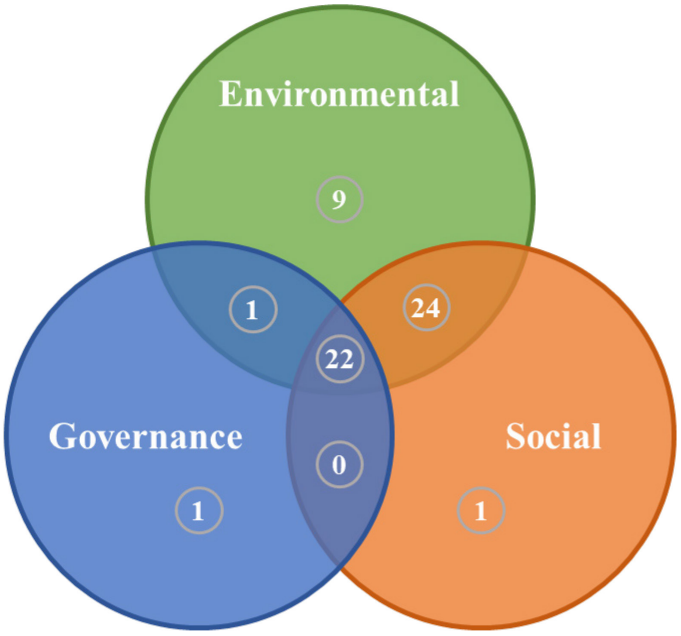


Fig.6. Distribution of ESG factors

Building upon this analysis, a detailed examination was conducted of the ESG factors referenced and applied within the reviewed studies. To enhance clarity and provide a structured overview (as shown in Figure 7), these factors were categorized into distinct subcategories aligned with each ESG dimensions. This approach consolidates all the factors referenced in the literature, revealing patterns and highlighting the most frequently cited factors.

The following section presents the results of this categorization. For each ESG dimension, the identified subcategories are explained, key factors within each are outlined, and their relevance to sustainability performance measurement is discussed. Additionally, a distinction is made between qualitative (black) and quantitative (white) factors.

Environmental

As depicted in Figure 6, the distribution of factors within the reviewed studies aligns with the results in section 6.1. The Environmental dimension encompasses the largest number of factors, with a total of 68 distinct factors, collectively mentioned 383 times across the studies. Notably, the Environmental category is the only grouping where explicit emphasis has been placed on qualitative systems such as Energy Control Management (8 mentions), Emission Control Management (11 mentions), Waste Control Management (13 mentions), and Standardized Environmental Management Systems (5 mentions). These systems are

typically discussed in terms of their existence rather than their operational specifics, encompassing activities like measuring, managing, and monitoring resource consumption and optimizing efficiency.

Among the most frequently mentioned factors, emission and air pollution (34 mentions) stand out as critical metrics. Organizations are urged to monitor greenhouse gases (e.g., CO2, CH4) and air pollutants (e.g., NOx, SOx) across operations, aligning with international frameworks like the Greenhouse Gas Protocol. These measures span production, transportation, and supply chain emissions, emphasizing both direct and indirect impacts. Similarly, toxic substances (8 mentions), such as hazardous chemicals, demand stringent monitoring and safe disposal practices to comply with regulations and reduce environmental harm.

Investments in environmentally friendly practices (13 mentions) reflect corporate commitment to sustainability, encompassing initiatives like tree plantations, biodiversity conservation, and animal welfare in terrestrial and marine ecosystems. These practices signify long-term ecological restoration efforts. Equally critical are environmental education and training (13 mentions), such as eco-driving programs, which empower employees and stakeholders to adopt sustainable behaviors and improve resource efficiency. Land use (4 mentions) requires careful monitoring to mitigate environmental footprints, while innovative activities like dematerialization of services (2 mentions) illustrate strategies for reducing resource dependency through digital transformation.

Respect for biodiversity and animal treatment (9 mentions) underscores organizations' responsibilities to preserve ecosystems and uphold ethical practices. Non-compliance, as evidenced by fines (7 mentions), highlights financial and reputational risks and serves as an indicator of areas for improvement. Adherence to environmental standards, regulations, and certifications (10 mentions collectively) is essential, with standards such as EMAS or ISO 14001 providing structured frameworks for regulatory compliance and enhancing transparency in sustainability reporting.

Efficient resource management is another central theme. Water use and waste (21 mentions) reflect organizational efforts to optimize consumption and minimize waste. Metrics such as recycled water (4 mentions) and freshwater use (4 mentions) highlight circularity and

sustainable management, particularly in water-scarce regions. Similarly, waste management emphasizes reducing overall waste output (23 mentions) and increasing recycled or recirculated waste (16 mentions). Effective strategies for managing hazardous waste (15 mentions) and preventing soil pollution (2 mentions) are critical to mitigating environmental risks and ensuring compliance.

Energy use is a pivotal factor, with overall energy consumption (26 mentions) serving as a key indicator of operational efficiency. Monitoring and reducing energy use allows organizations to identify inefficiencies and align with sustainability goals. The use of renewable energy (13 mentions), such as solar, wind, or hydropower, further demonstrates commitment to reducing dependency on fossil fuels. Investments in energy efficiency initiatives (5 mentions) reflect organizations' dedication to sustainable practices and decarbonization.

In production and manufacturing, material management is essential. The use of recycled materials (14 mentions) reduces reliance on virgin resources and promotes circularity, while monitoring overall material use (11 mentions) supports resource optimization. Managing scarce or vulnerable materials (10 mentions), such as rare earth elements and fossil fuels, underscores the need for conservation strategies. Additionally, the handling of hazardous or toxic substances (9 mentions) demands compliance with regulations to protect ecosystems and human health.

Sustainability in sold products includes factors such as the share of reusable materials (6 mentions), which reduces waste and aligns with consumer demands for sustainable solutions. Product design (5 mentions) focuses on eco-friendly materials and recyclability, while the amount of green products in their portfolio (4 mentions) demonstrates commitment to sustainability in offerings. Eco-packaging (3 mentions) and extended product lifetimes (2 mentions) further contribute to reducing resource consumption and environmental impact.

In supply chain management, the role of certified suppliers (6 mentions) is crucial, with companies favoring partners adhering to environmental certifications like ISO 14001 or EMAS. Suppliers with environmental mission statements (2 mentions) further reinforce collaborative sustainability goals. Sourcing from local suppliers (3 mentions) not only

supports regional economies but also reduces transportation emissions, aligning with environmental objectives.

Additional environmental factors include noise pollution (7 mentions), which impacts communities and ecosystems, and overall gas use (2 mentions), highlighting the need for efficiency and emissions management.

Social

The social dimension of sustainability performance measurement encompasses a broad array of factors addressing workforce development, community engagement, adherence to regulations, and contributions to societal well-being. Across the reviewed studies, 45 social factors were identified, collectively mentioned 219 times. These factors highlight organizations' efforts to create inclusive, safe, and supportive environments while fostering broader societal benefits.

Programs aimed at preventing injuries and promoting safety and health (21 mentions) are among the most frequently cited factors in this dimension. These initiatives focus on reducing workplace risks and ensuring employee well-being through training and education. People development (10 mentions) reflects investments in employee training, coaching, certifications, and professional development, enhancing workforce competency, engagement, and long-term organizational resilience. Additionally, addressing discrimination (8 mentions) through social training programs fosters inclusive workplace cultures, mitigates biases, and supports equity.

Adherence to regulations (6 mentions), such as labor laws ensures the safeguarding of worker rights and reflects an organization's commitment to fair employment practices. Standards (5 mentions) emphasize compliance with established frameworks to uphold workplace safety, equity, and inclusivity. Relatedly, efforts to fight corruption (2 mentions) and uphold human rights (2 mentions) illustrate broader ethical commitments integral to social sustainability.

The social dimension also includes financial obligations and contributions. Tax payments (4 mentions) demonstrate compliance with legal and societal responsibilities.

Work conditions (11 mentions) are a prominent factor, encompassing policies that promote freedom of association, protect privacy, and support family-friendly and professional development initiatives. Employer satisfaction (8 mentions) and the number of employees (8 mentions) highlight the importance of maintaining a stable and engaged workforce. Injuries (8 mentions) and safety expenditures (8 mentions) further underscore the need for investments aimed at reducing workplace accidents (5) and addressing health problems (4 mentions). Initiatives to create new job opportunities (7 mentions) demonstrate an organization's contribution to economic growth and social stability. Employer benefits (7 mentions), including psychosocial support, healthcare, financial aid, and proactive measures during economic downturns, reflect a comprehensive approach to employee well-being. Additionally, diversity initiatives (7 mentions) promote inclusivity across cultures, genders, and unique needs, fostering equitable opportunities at all levels. Fair employer compensation (7 mentions) complements these efforts by ensuring equitable pay structures that reflect the value and contribution of employees.

The quality of services and products (5 mentions) and customer satisfaction (5 mentions) are critical to building trust and maintaining an organizational reputation. Labels ensuring health and safety requirements (2 mentions) highlight an organization's commitment to consumer protection and compliance with regulatory standards.

Investments in community (17 mentions) stand out as a significant factor, emphasizing organizational commitment to societal well-being. These initiatives include fostering collaborations, supporting local purchasing, involving local communities, and promoting the inclusion of disabled individuals in social and economic life. The contributed value to society (11 mentions) captures broader efforts to enhance social cohesion and address societal challenges. Volunteer activities (7 mentions), often framed as philanthropic efforts, illustrate initiatives aimed at assisting disadvantaged groups and building relationships that benefit all stakeholders.

Governance

Although the governance dimension is less frequently discussed than environmental and social factors, it remains a critical component of sustainability performance measurement. Across the reviewed studies, 17 governance-related factors were identified, mentioned a total

of 34 times. These factors highlight the systems, structures, and processes organizations use to align their operations with sustainability principles and ensure accountability, transparency, and strategic control.

Governance emphasizes the role of corporate policies and strategies for sustainable development (3 mentions), which guide how firms integrate sustainability into their operations and long-term planning. This strategic alignment is further supported by the clear articulation of an organization's sustainability vision, mission, goals, and objectives (4 mentions), serving as a foundation for embedding sustainability into decision-making processes. Managing legal and regulatory compliance (2 mentions) underscores the necessity of adhering to applicable laws while aligning with voluntary sustainability standards, ensuring risk management and operational consistency.

A key governance factor is the development and maintenance of long-term relationships with stakeholders (5 mentions). This requires active engagement through initiatives such as stakeholder dialogue and view exchange programs, fostering trust and collaboration. Additionally, the number of board meetings (2 mentions) is indicative of the governance structure's responsiveness and oversight capacity, while board diversity (1 mention) highlights the importance of including varied perspectives.

Effective governance requires transparency in operations and decision-making. This includes compliance with mandatory and voluntary regulations and codes (3 mentions), reflecting organizational accountability to external stakeholders and adherence to industry standards. Furthermore, reporting sustainability progress (3 mentions) ensures that organizations communicate their achievements and challenges in a transparent manner and build credibility

Financial governance is another critical aspect, with factors such as the compensation proportion (2 mentions) ensuring equitable remuneration aligned with organizational and individual performance. Other considerations include dividend distribution (1 mention), which reflects the organization's financial strategy and stakeholder return management, and the management expenses ratio (1 mention), highlighting operational efficiency and the alignment of financial resources with sustainability objectives.

The review of the existing literature demonstrates that SPMS must strike a balance between comprehensiveness and manageability to ensure their practical application within organizations. While sustainability inherently encompasses a wide range of aspects of ESG, an excessive number of factors can overwhelm companies and hinder the effective implementation of performance measurement. To address this tension, the integration of highly informative and multidimensional ESG factors is essential. The analysis reveals that a streamlined set of factors, ideally ranging between 20 and 70, depending on industry context and organizational maturity, can deliver sufficient depth without sacrificing usability. Key to this approach is the selection of indicators that offer cross-dimensional insights. Categorizing ESG factors under the well-established structure, as proposed by frameworks like the UN Global Compact, has proven useful. Thereby , it is critical to recognize that some factors may interact or even conflict with each other (Asiaei et al., 2023; Hsu and Liu, 2010). For instance, certain environmental and economic goals might compete, requiring trade-offs that are specific to the organizational context. Consequently, it is not possible to establish a universally applicable set of factors that play a significant role across all industries and scenarios, as demonstrated by Qureshi (2022) in the context of supply chains. Instead, corporations must identify the specific fields of activity where they exert the most significant impact and align their PMSs accordingly (Bergmann et al., 2017).



Fig. 7. Overview of sustainable ESG factors.

However, the analysis reveals a notable imbalance in the treatment of ESG dimensions. Environmental factors are heavily represented, while social and especially governance-related aspects remain significantly underexplored. To improve the informational value and strategic utility of SPMS, a more balanced integration of all three ESG pillars is essential. Governance indicators, such as compliance with standards, ethical conduct, and the implementation of robust management systems, although less frequently addressed, can substantially enhance the interpretability, credibility, and long-term orientation of performance measurement.

Moreover, Figure 7 illustrates that quantitative factors clearly outweigh qualitative ones, reflecting a prevailing emphasis in the literature on indicators that are readily measurable and comparable across firms. This is particularly noteworthy when contrasted with the broader scholarly development since the early 2000s, which has identified a stronger inclusion of qualitative, non-financial performance dimensions, particularly in the context of sustainability, innovation, and stakeholder relations (Kurien and Qureshi, 2011). Although such qualitative aspects are represented in the reviewed literature, their relative underrepresentation in Figure 7 suggests that the shift toward more holistic and context-sensitive indicators is still not fully reflected in current measurement practices.

This dominance suggests a preference for operationalizable indicators, which are often considered more objective and decision relevant. Accordingly, factors that are both quantifiable and embedded within qualitative systems, such as certified management frameworks (e.g., ISO 14001), can serve as effective proxies for complex sustainability-related processes, thereby bridging the gap between measurability and contextual depth.

Nevertheless, Figure 7 should not be interpreted as a definitive or exhaustive representation of all relevant ESG factors. The figure is based solely on those indicators that were explicitly addressed in the reviewed portfolio of literature. As such, additional relevant factors may exist that were not captured due to their absence in the analyzed publication base. Furthermore, several of the identified factors could be further specified or aggregated into overarching thematic clusters. This would not only enhance conceptual clarity but also facilitate their practical application within SPMS by reducing redundancy and improving focus on strategic priorities.

6.2 Measuring ESG factors

The measurement of ESG factors has emerged as a critical component in advancing corporate sustainability. Effective measurement systems allow companies to monitor their progress, identify areas for enhancement, and align their operations with sustainability goals. However, measuring ESG factors is inherently complex, as it requires balancing diverse and often competing priorities across environmental stewardship, social equity, and corporate governance. Moreover, the lack of standardized approaches and the contextual nature of sustainability challenges make the task even more intricate. To address the third question, this chapter systematically examines the key considerations in designing ESG measurement frameworks.

The selection of appropriate ESG factors is the first and a critical step in developing measurement systems that effectively drive corporate sustainability improvements. This process demands a deliberate alignment with international standards, such as the Sustainable Development Goals and adherence to recognized regulatory frameworks. Anchoring ESG metrics within these established guidelines not only ensures compliance but also enhances the legitimacy and global relevance of corporate sustainability efforts (Addison et al., 2020).

Equally important is the integration of ESG factors with an organization's broader sustainability strategy and objectives. Metrics should align closely with corporate priorities to provide actionable insights that support progress toward long-term goals (Persdotter Isaksson et al., 2019; Tseng and Levy, 2019; Pádua and Jabbour, 2015). Such alignment enables companies to monitor and manage their sustainability performance in a manner that reinforces their strategic vision and operational purpose.

The dynamic nature of sustainability challenges also underscores the need for adaptive management. ESG factors must be designed to evolve over time, reflecting emerging priorities and improving measurement accuracy (Addison et al., 2020; Persdotter Isaksson et al., 2019; Tseng and Levy, 2019; Pádua and Jabbour, 2015; Ferris et al., 2008). Incorporating robust feedback mechanisms allows organizations to refine their metrics and frameworks iteratively (Nigri and Del Baldo, 2018). This adaptability ensures the continued relevance of ESG factors and enhances their ability to guide decision-making in a rapidly changing sustainability landscape.

Tailoring ESG factors to specific organizational levels further enhances their practical utility. Factors should address distinct operational needs while maintaining coherence with overarching corporate strategies (Caniato et al., 2012). This approach ensures that metrics are actionable across all levels of decision-making, from strategic planning to day-to-day operations, making them an integral part of the SPMS.

Stakeholder engagement plays a pivotal role in developing relevant and actionable ESG factors. Involving employees, customers, investors, and community representatives in the design process fosters legitimacy and ensures that the metrics reflect the needs and expectations of all impacted stakeholders (Addison et al., 2020; Coutinho et al., 2018; Pádua and Jabbour, 2015, Nigri and Del Baldo, 2018; Kühnen and Hahn, 2019). This inclusive approach not only enhances the social acceptability of the measurement framework but also drives innovation through diverse perspectives (Nudurupati et al., 2016). By incorporating shared targets or sector-wide metrics, organizations can foster collective progress and improve the comparability of sustainability outcomes (Persdotter Isaksson et al., 2019).

Effective ESG measurement systems require a well-structured framework that addresses outcomes at various organizational levels while categorizing factors in a manner that promotes clarity, transparency, and actionable insights. Such systems must account for individual, team-level, and overall company outcomes, ensuring that performance is monitored across all dimensions of organizational impact (Tseng and Levy, 2019; Ferris et al., 2008).

To enhance the utility of these systems, many frameworks employ an index-based approach, where weights are assigned to individual KPIs. This weighting reflects the relative contribution of each KPI to overall sustainability, ensuring a balanced representation of priorities across ESG dimensions (Wicher et al., 2019). Such indices help organizations interpret complex data, facilitating a more holistic understanding of their sustainability performance.

Visualization tools, such as multi-level dashboards, further enhance the effectiveness of ESG measurement systems. These dashboards allow organizations to display results at various levels of detail, improving transparency and fostering stakeholder engagement (Wicher et

al., 2019). By making performance data accessible and interpretable, dashboards promote accountability and drive informed decision-making across organizational hierarchies.

Meanwhile, human factors can influence their adoption and outcomes. Manager-employee and team-level interactions play a crucial role in enabling ESG factors in SPMSs to drive improvements. The dynamic collaboration between managers and their teams can foster a culture of accountability and engagement, which is essential for ensuring the successful implementation of sustainability-focused metrics (Tseng and Levy, 2019). Encouraging open communication while maintaining objectivity, such as through anonymous data collection, can improve the reliability and credibility of reported metrics (Coutinho et al., 2018).

Technological advancements, particularly the integration of IoT and Big Data, are revolutionizing ESG measurement. Real-time monitoring of sustainability metrics enables organizations to quickly identify trends, respond to emerging issues, and optimize operational efficiency (Nudurupati et al., 2016). Additionally, automating data inputs from sustainability reports can significantly reduce manual entry errors, enhance scalability, and increase the reliability of metrics (Grecu et al., 2020). Software tools leveraging advanced algorithms, such as genetic algorithms, can provide actionable insights by pinpointing underperforming factors and recommending targeted improvements (Grecu et al., 2020).

Simplifying sustainability reporting tools further enhances their usability, ensuring accessibility for a broad range of organizational stakeholders (Nigri and Del Baldo, 2018). However, careful attention must be paid to potential cognitive biases and relational factors that could distort performance evaluations. Issues such as favoritism, political dynamics, or emotional reactions to feedback can undermine the credibility and effectiveness of the measurement system. Establishing clear evaluation standards and structured accountability systems helps mitigate these risks, fostering fairness and driving improvements in organizational performance (Ferris et al., 2008).

However, designing and implementing effective KPIs requires careful attention to specific attributes and methodologies to ensure they provide meaningful insights and drive improvements. To enable comparative analysis and facilitate long-term trend evaluation, KPIs should define target, threshold, worst, and real values. These parameters create a clear

framework for assessing performance over time and benchmarking against internal or external standards (Wicher et al., 2019). By identifying critical KPIs and their interdependencies, organizations can focus on areas with the greatest potential for improvement. This approach not only enhances resource allocation but also helps in identifying synergies and mitigating conflicts between different performance objectives (Wicher et al., 2019; Coutinho et al., 2018).

A shift in measurement practices is also recommended, moving away from exclusively quantitative approaches to more "pragmatic" methodologies that integrate qualitative and behavioral dimensions. Such practices provide a holistic view of sustainability performance by capturing the complexities of organizational behaviors and stakeholder interactions (Nudurupati et al., 2016). For instance, factors measured through Likert-scale questionnaires and qualitative assessments can offer both numerical data and nuanced insights into areas like stakeholder satisfaction or employee engagement (Coutinho et al., 2018).

Furthermore, organizations should strive for a balanced representation of sustainability performance by incorporating both positive and negative factors. While positive factors highlight achievements, negative factors draw attention to shortcomings and areas needing improvement. This balanced approach provides a more comprehensive and transparent view of sustainability performance (Kühnen and Hahn, 2019).

To fully capture the breadth of ESG performance, measurement methodologies must reflect the diverse outcomes, processes, and relationships inherent in sustainability efforts. These methods can be broadly categorized into efficiency-based metrics, savings and reduction tracking, and input-output measures, each providing unique insights into corporate sustainability.

Efficiency Metrics focus on the relationship between resources consumed and output produced, offering a relative measure of performance. By assessing how efficiently resources such as energy, water, or materials are used, organizations can identify areas for optimization and maximize resource productivity (Caniato et al., 2012). Efficiency measures are particularly valuable for benchmarking and continuous improvement, as they provide actionable insights into operational processes.

Savings and Reductions emphasizing the quantification of improvements achieved through sustainability initiatives. Metrics in this category include cost savings from energy-efficient practices, reductions in greenhouse gas emissions, and minimized waste generation (Caniato et al., 2012; Grecu et al., 2020). These measures not only highlight progress but also demonstrate the tangible financial and environmental benefits of sustainability efforts.

Output Measures capture the outcomes of corporate activities, encompassing both negative and positive impacts. Negative outputs, such as waste and pollution, are essential for identifying areas that require mitigation (Caniato et al., 2012; Lisi, 2015). Conversely, positive outputs—such as contributions to social well-being, economic development, and ecological restoration—underscore the broader value created by sustainability initiatives (Kühnen and Hahn, 2019).

Input Metrics, such as resource consumption and adherence to environmental regulations or voluntary standards, offer insights into the sustainability of inputs driving corporate activities (Lisi, 2015). These measures focus on the materials, energy, and processes that feed into production and service delivery, emphasizing compliance and responsible sourcing.

Lastly, Relative Measures focus on relationships rather than absolute values, examining how different sustainability elements interact and influence one another. For example, Stewart (2008) highlights the importance of evaluating interdependencies within systems to better understand the trade-offs and synergies inherent in ESG efforts. This relational perspective allows for a more nuanced understanding of sustainability performance, facilitating more informed decision-making.

By employing ESG measurement frameworks that are strategically aligned with corporate goals, adaptable to evolving sustainability priorities, inclusive of diverse stakeholder perspectives, and supported by technological innovations such as real-time monitoring and data analytics, organizations can construct a comprehensive ESG measurement system. This system incorporates both quantitative and qualitative indicators, uses clear performance thresholds, and balances positive and negative outcomes. As a result, it not only monitors performance across multiple dimensions but also enables targeted improvements, fosters

organizational learning, and contributes to long-term sustainability value creation for corporations.

7. Future Research

The findings of this SLR highlight several promising avenues for future research in SPMS, particularly regarding the integration and impact of ESG factors. Addressing these gaps will not only enrich academic discourse but also offer practical solutions for companies striving to improve their sustainability practices. Below, interconnected research directions are outlined, each contributing to the broader understanding and application of ESG in SPMSs.

The regional context presents an opportunity for deeper investigation. Exploring regional and cross-border impacts on ESG performance can uncover how local policies, cultural contexts, and regulatory environments influence the integration of ESG factors. Cross-border analyses, particularly in sustainable supply chains, can identify global best practices, a greater understanding and areas for harmonization (Bulsara et al., 2016). Furthermore, the underrepresentation of North America in current research highlights a significant gap, suggesting the need for studies examining how regional disparities affect sustainability performance and decision-making. This research direction is essential for fostering a more comprehensive understanding of global sustainability practices and their local adaptations (Zhao et al., 2021).

Another promising area lies in advancing the measurement of combined environmental and financial metrics. Aligning environmental sustainability with economic outcomes is crucial for demonstrating the business case for sustainability. Future studies should explore integrated metrics that identify win-win opportunities, enabling companies to evaluate the financial impacts of their environmental initiatives. These metrics could guide decision-making processes, ensuring that sustainability efforts are not only environmentally beneficial but also economically viable. By linking environmental impacts with financial performance, such research would address a key gap in current measurement practices and enhance the value proposition of sustainability initiatives.

Additionally, long-term and sector-specific studies on sustainability impacts are needed to assess the enduring effects of sustainability initiatives. Longitudinal studies focusing on areas such as corporate social responsibility, Public-Private Partnerships, and innovative business models can provide valuable insights into the sustainability-performance relationship over time. Sector-specific adaptations of sustainability frameworks, particularly

in areas like biodiversity, offer another avenue for research, as these studies can refine the applicability of existing models and enhance their effectiveness across industries. Such work would contribute to a more nuanced understanding of how sustainability efforts evolve and impact businesses in diverse contexts (Addison et al., 2020).

Finally, future research should focus on enhancing stakeholder engagement and exploring multi-dimensional sustainability frameworks. Effective communication of sustainability performance to external stakeholders remains a critical challenge. Investigating mechanisms to improve stakeholder engagement and the transparency of performance metrics can enhance the credibility and utility of sustainability reporting. Moreover, exploring the interactions between framework dimensions—such as managerial levels and stakeholder perspectives—can yield deeper insights into the complexities of sustainability management. Clear and focused purposes for SPMSs are essential to avoid overly complex and broad frameworks, ensuring practical applicability and strategic alignment.

8. Conclusion and Contribution

This SLR aimed to synthesize existing knowledge on SPMSs and address the integration and measurement of ESG factors within these frameworks. The study was structured around three core research questions:

1. What is the current state of the literature on SPM?
2. Which ESG factors can be integrated into a SPMS for companies to maximize information output while minimizing the number of required factors?
3. How can ESG factors be measured to contribute to improvements and long-term sustainability value creation for corporations?

The findings reveal that while substantial advancements have been made in developing SPMSs, significant gaps and challenges persist. The reviewed literature demonstrates a steady increase in scholarly interest, with the manufacturing and multi-industry contexts dominating the field. Europe and Asia emerge as leading regions for data sources, reflecting regional regulatory frameworks and industrial priorities. However, the imbalance across ESG dimensions—particularly the underrepresentation of governance factors—hinders the holistic advancement of SPMSs.

The analysis of ESG factors highlights the multidimensional nature of sustainability, emphasizing the need for frameworks that integrate environmental stewardship, social equity, and governance accountability. Despite the breadth of factors identified, inconsistencies in categorization and a lack of context-specific adaptability present barriers to practical implementation. Moreover, the measurement of ESG factors remains fragmented, with diverse methodologies and a lack of standardization limiting their comparability and utility for decision-making.

By answering the research questions, this study underscores the importance of aligning SPMS frameworks with organizational strategies, stakeholder expectations, and sustainability objectives. The findings advocate for more adaptive, inclusive, and technology-enabled approaches to ESG integration and measurement, ensuring that SPMSs effectively drive corporate sustainability improvements.

This SLR makes several notable contributions to the academic discourse on SPMSs while offering practical insights for organizations aiming to improve their sustainability practices. By synthesizing the existing literature, it identifies critical trends, advancements, and gaps, creating a cohesive overview of the field's evolution. This synthesis not only highlights areas where scholarly efforts have converged but also reveals key divergences, providing a robust foundation for future research directions. A core strength of this review lies in its detailed categorization and analysis of ESG factors across all relevant dimensions. By addressing this critical gap, it underscores the importance of balanced and context-specific frameworks. Such frameworks are essential for aligning sustainability goals with the practical realities organizations face, enabling more effective and impactful action. Methodologically, the study advances SPMS development by advocating for integrated, adaptive, and stakeholder-focused approaches to ESG measurement. The findings emphasize the value of combining quantitative and qualitative metrics, leveraging digital technologies, and embedding sustainability deeply within core business processes. These recommendations ensure that measurement systems remain relevant and actionable in a rapidly evolving sustainability landscape.

For practitioners, the review offers actionable guidance on designing and implementing SPMSs that simultaneously support sustainability goals and enhance corporate performance. By showcasing effective practices and common pitfalls, it equips managers with the tools needed to navigate the complexities of ESG integration, ensuring practical relevance alongside theoretical insights. Finally, this review sets out a comprehensive research agenda to advance SPMS scholarship. It calls for longitudinal studies, regional and cross-industry analyses, and the exploration of advanced digital technologies to address existing gaps. This roadmap bridges academic inquiry and practical challenges, ensuring that future research aligns with the pressing needs of organizations striving for sustainable success. Through its cohesive synthesis, insightful analysis, and forward-looking recommendations, this review provides both a scholarly contribution and a valuable resource for organizations committed to sustainability.

In the end, the integration of ESG factors into SPMSs represents a pivotal challenge and opportunity for organizations in the 21st century. As sustainability becomes a cornerstone of corporate strategy, the ability to measure, manage, and report ESG performance will

determine a company's capacity to thrive in a rapidly evolving landscape. By synthesizing existing knowledge and offering a forward-looking perspective, this review contributes to bridging the gap between theoretical frameworks and practical applications, supporting both academic inquiry and organizational transformation in the pursuit of sustainable success.

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Beitrag 2

Die sozialen Aktivitäten der DAX40 Unternehmen und die Konformität mit deren Unternehmensstrategien

Abstrakt

Mit ihrem Green Deal hat die EU den Fokus auf den ökologischen Umbau der europäischen Wirtschaft gelegt, weshalb Unternehmen zunehmend ihre strategischen Aktivitäten auf Umweltfragen ausrichten. Neben dem Thema Klimaschutz ist aber auch der Bereich der sozialen Aktivitäten eine wesentliche Säule von Nachhaltigkeit. Unternehmen müssen sich demnach auch mit der Bedeutung ihres internen sowie externen sozialen Beitrags auseinandersetzen und diese in ihre Strategie integrieren. Dabei ist es i.d.R. weniger eine Herausforderung, soziale Aktivitäten zu planen, umzusetzen und darüber zu berichten, vielmehr müssen Unternehmen diese Aktivitäten in die Zielerreichung ihrer Unternehmens- oder mindestens Nachhaltigkeitsstrategie einbetten können. Dieser Beitrag bietet auf Basis eines empirischen Forschungsansatzes einen aktuellen Einblick in die Umsetzungspraxis der DAX40-Unternehmen und zeigt deren Entwicklungsperspektiven auf.

I Einleitung

Mit regulatorischen Anforderungen wie dem Lieferkettenpflichtensorgfaltsgesetz[31] (LkSG) und der europäischen Lieferkettenrichtlinie Corporate Sustainability Due Diligence Directive[32] (CSDDD) hat der politische Druck auf Unternehmen zugenommen, sich intensiver mit ihren sozialen Verpflichtungen zu beschäftigen. Auch wenn die konkrete Umsetzung unter der seit Mai 2025 amtierenden Bundesregierung, noch immer unsicher ist, bleibt die gesellschaftliche Erwartungshaltung klar: Unternehmen sollen soziale Verantwortung nicht nur formal anerkennen, sondern auch aktiv wahrnehmen.

Zukünftig wird es nicht mehr ausreichen, sich ausschließlich auf die Erfüllung gesetzlicher Anforderungen zu beschränken. Unternehmen betreiben heute bereits darüber hinausgehende Aktivitäten. Sie engagieren sich nicht nur innerhalb ihrer Unternehmen für die Förderung sozialer Strukturen, sondern auch im gesellschaftlichen Raum, wodurch sie einen bedeutenden Beitrag zum Gemeinwohl leisten. Durch Sponsoring sind Unternehmen z.B. ein wichtiger Stützpfeiler von Vereinen. Obgleich diese Aktivitäten nicht ausschließlich aus altruistischen Motiven erfolgen, bleibt der daraus resultierende positive Effekt auf die Gesellschaft unbestritten.

Um mit den sozialen Aktivitäten einen tatsächlichen relevanten Mehrwert zu schaffen, sollten diese zielführend geplant, durchgeführt sowie deren Erfolg im Nachgang analysiert werden. Dies setzt eine Integration innerhalb der Strategie eines Unternehmens voraus.[33] Dabei können diese sozialen Ziele innerhalb der allgemeinen Unternehmensstrategie, aber auch in einer individuell fokussierten Nachhaltigkeitsstrategie verankert werden. Im Rahmen einer Nachhaltigkeitsstrategie haben Unternehmen somit die Möglichkeit, die Maßnahmen zur Zielerreichung detaillierter darzustellen und ihren Maßnahmenplan und auch die Zielerreichung öffentlich zu machen. Während Umweltziele häufig bereits in die

[31] BGBl. I 2021 S. 2959.
[32] Richtlinie (EU) 2024/1760 des Europäischen Parlaments und des Rates vom 13.06.2024 über die Sorgfaltspflichten von Unternehmen im Hinblick auf Nachhaltigkeit und zur Änderung der Richtlinie (EU) 2019/1937 und der Verordnung (EU) 2023/2859, ABlEU Reihe L 2024/1760 vom 05.07.2024.
[33] Vgl. Napier/Knight/Luo/Delios, Journal of International Business Studies 2022 S. 61-77.

allgemeine Unternehmensstrategie integriert und öffentlich zum Ausdruck gebracht werden, sind soziale Ziele nur selten ein wesentlicher Bestandteil von Unternehmensstrategien.[34]

Neben diversen freiwilligen Publikationen erfolgt die Berichterstattung zu den sozialen Aktivitäten in den Geschäfts- und Nachhaltigkeitsberichten. Darüber hinaus zeigen Zülch et al. (2025)[35], dass diese zunehmend auch in Zwischenberichten aufgegriffen werden. Eine Verknüpfung dieser Aktivitäten mit der Unternehmens- oder zumindest Nachhaltigkeitsstrategie bleibt jedoch häufig aus.[36] Dabei sollte die strategische Verankerung der sozialen Aktivitäten nicht nur formal dokumentiert, sondern auch durch Zielsysteme operationalisiert werden. Dies ist relevant, weil eine solche systematische Verknüpfung sicherstellt, dass soziale Aktivitäten nicht nur isolierte Einzelmaßnahmen bleiben, sondern gezielt auf mess- und überprüfbare Unternehmensziele einzahlen. Unternehmen profitieren dadurch von einer besseren Steuerung und Erfolgsbewertung sozialer Aktivitäten, was deren Wirksamkeit erhöht und die Legitimation gegenüber Stakeholdern stärkt.[37] Es stellt sich daher die Frage, inwieweit sich die von Unternehmen berichteten sozialen Aktivitäten auf deren Unternehmens- oder Nachhaltigkeitsstrategie zurückführen lassen. Dazu formulieren wir folgende Forschungsfrage:

Sind die innerhalb des Jahresabschlusses publizierten sozialen Aktivitäten strategisch verankert?

Um diese Frage zu beantworten, werden die sozialen Aktivitäten der DAX40-Unternehmen, die in den Geschäfts- und Nachhaltigkeitsberichten berichtet werden, und deren Konformität mit den Unternehmens- und Nachhaltigkeitsstrategien untersucht. Im folgenden Abschn. II. wird dazu zunächst das theoretische Konzept dieses Beitrags vorgestellt. Abschn. III. stellt die Methodik vor. Die Vorstellung der Ergebnisse und deren Diskussion erfolgt in Abschn. IV. Abschn. V. präsentiert konkrete Handlungsempfehlungen. Abschließend werden die

[34] Vgl. Knelsen, Kritische Betrachtung der Darstellung sozialer Nachhaltigkeit in Geschäftsberichten. FOM-Forschung KCN Schriftenreihe, Band 02, 2021, S. 17.
[35] Zülch/Schüder/zum Felde/Gemünden, KoR 2025 S. 279-286.
[36] Vgl. Bundesministerium für Wirtschaft und Klimaschutz/Bundesministerium für Bildung und Forschung, Nationale Strategie für Soziale Innovationen und Gemeinwohlorientierte Unternehmen, BT-Drucks. 20/8372, S. 11 ff.; Bertelsmann Stiftung, Nachhaltigkeitsstrategien erfolgreich entwickeln, 2023, S. 22 ff., s.u. https://fmos.link/14931 (Abruf: 11.03.2026).
[37] Vgl. Napier/Knight/Luo/Delios, Journal of International Business Studies 2022 S. 61-77.

zentralen Ergebnisse in einem Fazit zusammengefasst und ein Ausblick auf zukünftige Entwicklungen gegeben (Abschn. VI.).

II Theoretisches Konzept

Laut Welge/Al-Laham/Eulerich (2023)[38] beginnt der Planungsprozess der Aktivitäten eines Unternehmens mit der Definition des Leitbildes, welches die übergeordneten Werte und Visionen der Organisation festlegt. Auf dieser Grundlage werden spezifische Leitziele formuliert, die als strategische Orientierungspunkte dienen. Darauf aufbauend erfolgt eine umfassende Analyse des Unternehmensumfelds, bestehend aus einer Makroumweltanalyse, einer Mikroumweltanalyse und einer strategischen Unternehmensanalyse (vgl. Abb. 1). Diese Analysen liefern essenzielle Informationen zur externen und internen Situation des Unternehmens, die wiederum die Basis für die Strategieformulierung bilden. Im Anschluss werden die potenziellen Strategien bewertet und daraufhin eine oder mehrere ausgewählt. Die gewählte Strategie bestimmt die Planung und Umsetzung operativer Maßnahmen und Aktivitäten, was schließlich bedeutet, dass diese verschiedenen Aktivitäten die Strategie widerspiegeln.[39]

[38] Welge/Al-Laham/Eulerich, Strategisches Management: Grundlagen – Prozess – Implementierung, 2023.
[39] Vgl. Balderjahn, Nachhaltiges Management und Konsumentenverhalten, 2. Aufl. 2021, S. 125.

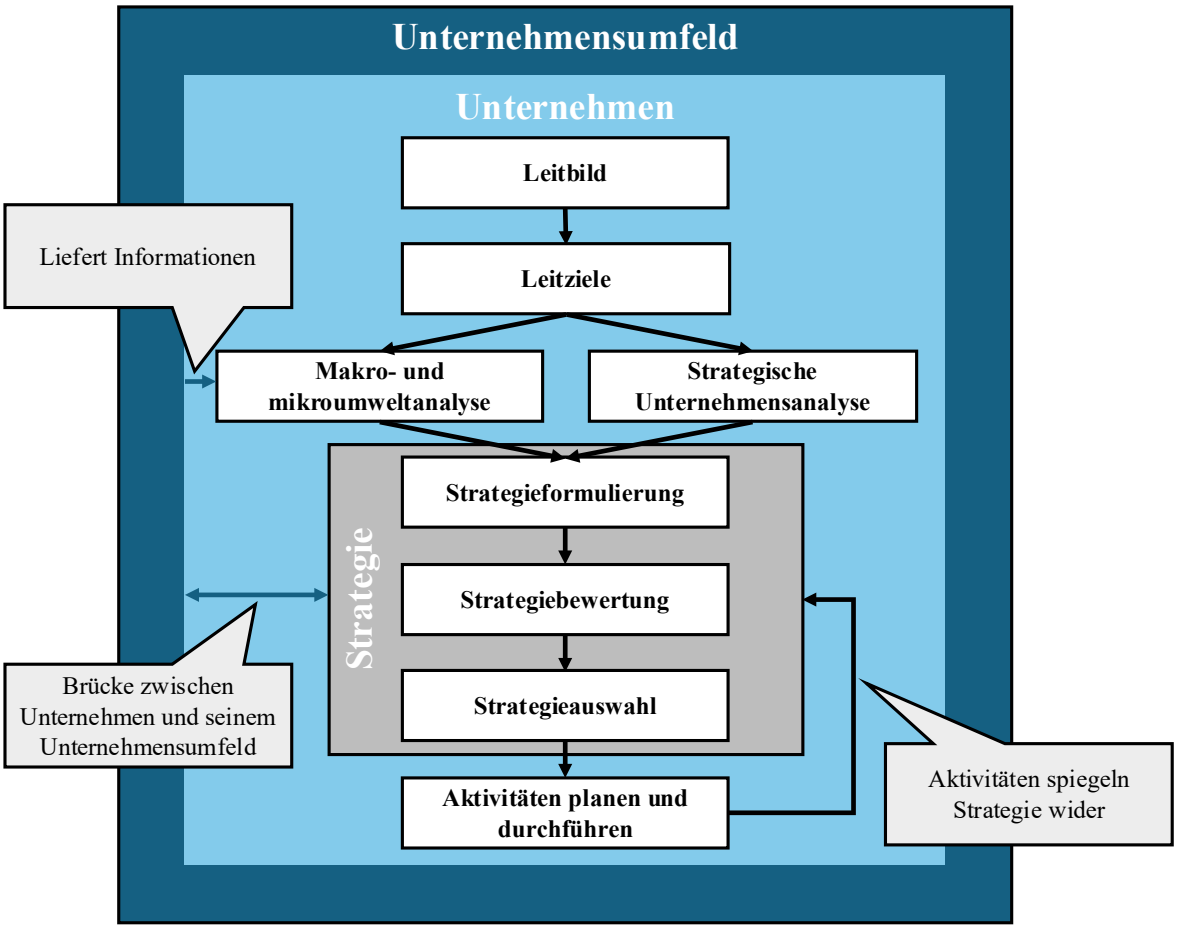


Abb. 1: Zusammenspiel zwischen einem Unternehmen, seinem Umfeld und deren Aktivitäten (Quelle: Eigene Darstellung)

Diese Strategie kann sowohl die allgemeine Unternehmensstrategie als auch eine spezielle Nachhaltigkeitsstrategie beinhalten. Letztere umfasst die Dimensionen Ökologie, Soziales und Ökonomie.[40] Dabei ist entscheidend, dass die Unternehmensstrategie als Bindeglied zwischen dem Unternehmen und seinem externen Umfeld fungiert. Sie ermöglicht es dem Unternehmen, auf externe Entwicklungen zu reagieren, interne Entscheidungen zu lenken und Stakeholder zu informieren. Somit stellt sie eine Brücke dar, die den nachhaltigen Erfolg eines Unternehmens sicherstellt.

Das Unternehmensumfeld verlangt aufgrund zunehmenden Drucks durch regulatorische Vorgaben und gesellschaftliche Erwartungen nach nachhaltigen sozialen Geschäftspraktiken.[41] Dazu zählen z.B. externe soziale Aktivitäten wie bezahlte

[40] Vgl. Lloret, Modeling Corporate Sustainability Strategy, 2016, S. 419.
[41] Vgl. Labuschagne/Brent/van Erck, Journal of Cleaner Production 2005 S. 378.

Freiwilligenarbeit von Mitarbeitenden, Sponsorings, die Einrichtung von Stiftungen oder Unternehmensspenden.[42] Ebenso gehören allgemeine Aspekte wie ethisches Handeln, der Schutz von Menschenrechten sowie die Verhinderung von Kinderarbeit und Korruption dazu. Schließlich umfasst der Bereich auch interne Aktivitäten, etwa Arbeitsbedingungen und -sicherheit, Weiterbildungsmöglichkeiten, Gesundheitsschutz, Gleichberechtigung und Diversität. [43]

Unternehmen, die diese Praktiken nicht verfolgen, sind nicht nur regulatorischen und finanziellen Risiken ausgesetzt, sondern sehen sich auch steigenden Finanzierungskosten gegenüber,[44] da Kapitalmärkte soziale und ESG-Risiken zunehmend in die Bewertung einbeziehen[45]. Gleichzeitig erhöht die Nichterfüllung entsprechender Anforderungen die Wahrscheinlichkeit zukünftiger Sanktionen.[46] In Kombination mit potenziellen Reputationsverlusten führt dies zu einer geringeren Attraktivität als Geschäftspartner und letztlich zu einer sinkenden Wettbewerbsfähigkeit.[47] Langfristig kann dies zur Marginalisierung des Unternehmens führen, während nachhaltige Wettbewerber Marktanteile gewinnen. Nachhaltigkeit ist daher nicht nur eine moralische Verpflichtung, sondern auch eine wirtschaftliche Notwendigkeit für langfristigen Erfolg.[48]

Unternehmen sind in ihrer Handlungsweise jedoch stark an ihre strategische Ausrichtung gebunden. Das bedeutet, dass sie nur dann nachhaltige soziale Aktivitäten umsetzen, wenn soziale Aspekte explizit in ihrer Strategie verankert sind. Fehlt eine solche Integration, werden keine sozialen Aktivitäten durchgeführt und es erfolgt keine Berichterstattung dazu.[49] In der Praxis haben Unternehmen daher soziale Nachhaltigkeitsstrategien entwickelt, welche unternehmensexterne und -interne Themen fördern sollen.[50] Die Förderung der

[42] Vgl. Boström/Vifell/Klintman/Soneryd/Hallström/Thedvall, Nature and Culture 2015 S. 132 f.; Vallance/Perkins/Dixon, Geoforum 2011 S. 343.
[43] Vgl. Kirschten, Work-Life-Balance: Herausforderungen – Konzepte – praktische Erfahrungen, 2014, S. 28; vgl. Kirschten, Nachhaltiges Personalmanagement – Aktuelle Konzepte, Innovationen und Unternehmensentwicklung, 2017, S. 255.
[44] Vgl. EU-Kommission, Der europäische Grüne Deal: Mitteilung der Kommission an das europäische Parlament, den europäischen Rat, den Rat, den europäischen Wirtschafts- und Sozialausschuss und den Ausschuss der Regionen COM(2019) 640 final, S. 2, s.u. https://fmos.link/14932 (Abruf: 11.03.2026).
[45] Vgl. Fandella/Sergi/Sironi, Corporate Social Responsibility and Environmental Management 2023 S. 1712-1722.
[46] Vgl. DesJardine/Grewal/Viswanathan, Organization Science 2023 S. 1716-1735.
[47] Vgl. Shiu/Yang, Strategic Management Journal 2017 S. 455-470.
[48] Vgl. Fahim, Journal of the International Academy for Case Studies 2024 1-3.
[49] Vgl. Steinmann/Schreyögg/Koch, Management: Grundlagen der Unternehmensführung – Konzepte – Funktionen – Fallstudien, 7. Aufl. 2013, S. 160.
[50] Vgl. Baumgartner/Ebner, Sustainable Development 2010 S. 78.

unternehmensexternen und -internen Themen ist unternehmensindividuell und von den verfügbaren Ressourcen abhängig.

III Methodik

Zur Beantwortung der Forschungsfrage werden die Geschäfts- und Nachhaltigkeitsberichte der DAX40-Unternehmen mittels der Inhaltsanalyse nach Mayring untersucht. Dieser Ansatz eignet sich für die Untersuchung, da er einen flexiblen Analyserahmen bietet, um Texte aus Geschäfts- und Nachhaltigkeitsberichten transparent, regelbasiert und systematisch zu analysieren und zu strukturieren. Dabei werden die Nachvollziehbarkeit und Reproduzierbarkeit gewährleistet.[51] Mithilfe dieses Ansatzes kann die Textmenge und Komplexität der unstrukturierten Nachhaltigkeitsdaten innerhalb der Berichte reduziert sowie fokussiert werden, ohne dass relevante Informationen verloren gehen.[52]

[51] Vgl. Mayring, Qualitative Inhaltsanalyse: Grundlagen und Techniken, 13. Aufl. 2022, S. 49 ff.
[52] Vgl. Elo/Kyngäs, Journal of Advanced Nursing 2008 S. 108.

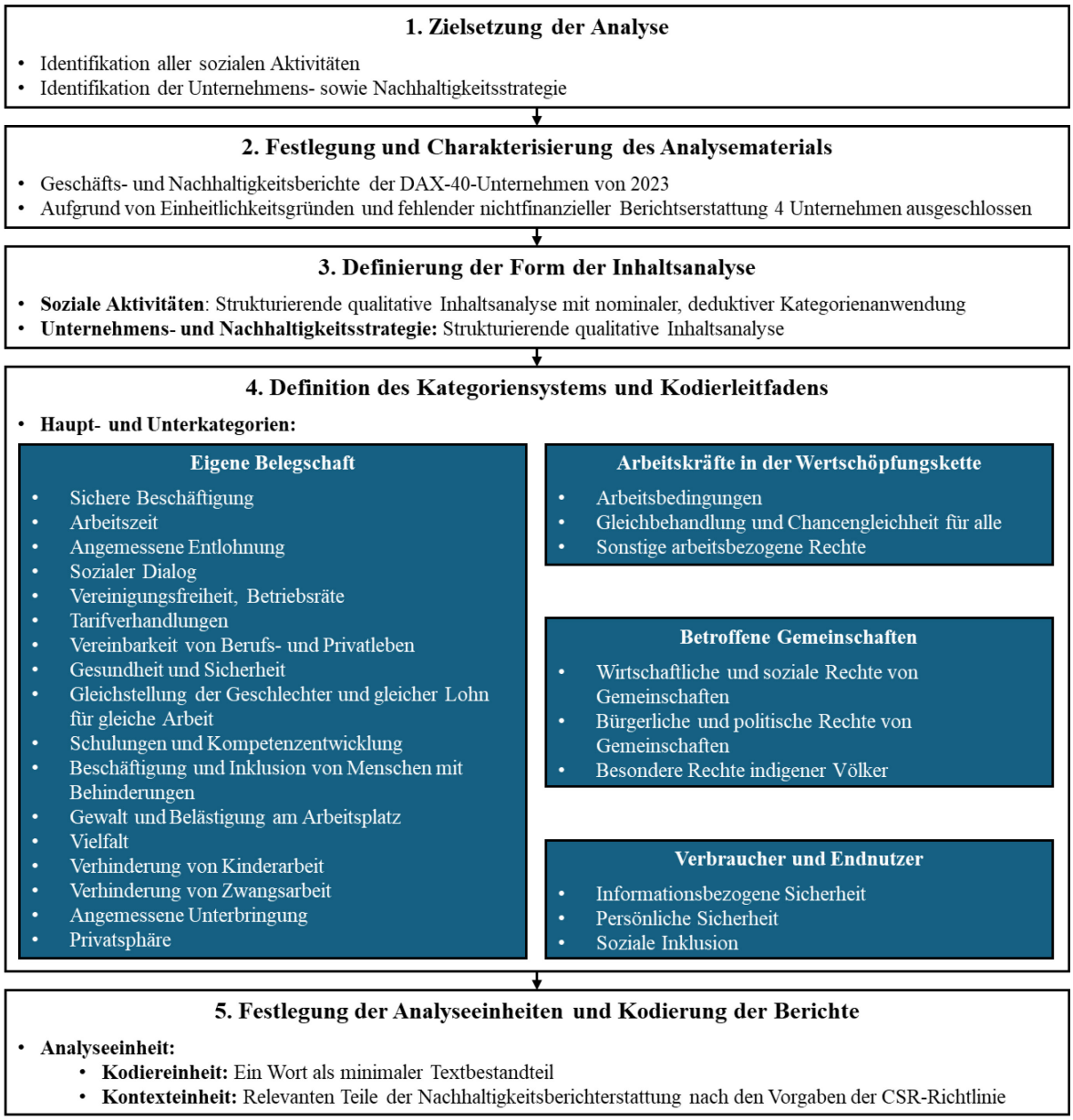


Abb. 2: Abgeändertes Ablaufschema zur Inhaltsanalyse nach Mayring (Quelle: Eigene Darstellung)

Bei der Durchführung orientiert sich das Vorgehen der Inhaltsanalyse am leicht geänderten Ablaufschema nach Mayring (siehe Abb. 2).[53] Als Erstes wird die Zielsetzung der Analyse festgelegt. Hierzu werden alle im Bericht genannten sozialen Aktivitäten sowie die Unternehmens- und Nachhaltigkeitsstrategie als Analyseobjekte definiert. Im zweiten Schritt wird das Analysematerial festgelegt und charakterisiert. Als Datengrundlage dienen

[53] Vgl. Mayring, a.a.O. (Fn. 21), S. 61.

die Geschäfts- und Nachhaltigkeitsberichte der DAX40-Unternehmen für das Geschäftsjahr 2023, die sich zum Stichtag 31.12.2024 im DAX befanden. Im gleichen Schritt wurden vier Unternehmen aus der Grundgesamtheit ausgeschlossen. Airbus und QIAGEN wurden ausgeschlossen, da es sich rechtlich um niederländische Unternehmen handelt und sie somit nicht vollständig unter die Berichterstattungspflichten nach deutschem Recht fallen. Siemens Healthineers und Porsche Automobil Holding wurden aus der Stichprobe ausgeschlossen, da sie gemäß den regulatorischen Vorgaben von der eigenständigen nichtfinanziellen Berichterstattung befreit sind. Diese Befreiung ergibt sich daraus, dass sie in den Konzernlagebericht eines übergeordneten Mutterunternehmens einbezogen sind, in dem die nichtfinanziellen Informationen auf Konzernebene offengelegt werden. Daten zur sozialen Nachhaltigkeit von externen Webseiten, Blogs oder sozialen Netzwerken werden nicht verwendet, da die Verlässlichkeit, der Rechtsrahmen und die Datenkonsistenz aufgrund fehlender Prüfung eingeschränkt sind. Die Branchenzuordnung orientiert sich an der Klassifizierung des Finanzportals börse.de, wodurch sechs Branchen gegeben sind.

Im dritten Schritt wird die Form der Inhaltsanalyse definiert. Als Analyseform für die sozialen Aktivitäten wird die strukturierende qualitative Inhaltsanalyse mit nominaler, deduktiver Kategorienanwendung genutzt. Diese strukturierende Analyseform ermöglicht es, gezielt Informationen aus den Berichten zu extrahieren und diese passenden Kategorien zuzuordnen. Zur Identifikation der Unternehmens- und Nachhaltigkeitsstrategie wird die strukturierende qualitative Inhaltsanalyse verwendet.

Der nächste Schritt umfasst die Definition des Kategoriensystems und Kodierleitfadens. Die Haupt- und Unterkategorien werden theoriegeleitet, deduktiv auf der Grundlage der Vorgaben der zukünftigen Nachhaltigkeitsberichterstattung nach den ESRS S1 bis S4 gebildet (siehe Abb. 2). Von einer Berücksichtigung des ESRS 2 sowie der themenspezifischen Standards wurde abgesehen, da diese 2023 nicht veröffentlicht waren und folglich die Unternehmen noch nicht darüber berichten konnten. Dies ermöglicht eine systematische und strukturierte Analyse, die auf einem theoretischen sowie rechtlichen Fundament basiert, und erhöht die Vergleichbarkeit und die Reproduzierbarkeit der Ergebnisse. Dennoch ist anzumerken, dass diese Vorgehensweise gewisse Limitationen mit sich bringt. So besteht die Gefahr einer Überstrukturierung, da die vordefinierten Kategorien den Interpretationsspielraum einschränken können. Damit verbunden ist ein Mangel an

Offenheit gegenüber emergenten Themen, die in den Berichten zwar relevant sein könnten, aber nicht in das bestehende Kategoriensystem passen. Folglich besteht das Risiko, dass neuartige oder unerwartete Aspekte der sozialen Aktivitäten unzureichend berücksichtigt werden. Der Kodierleitfaden definiert die Kategorien und beschreibt je Kategorie ein Ankerbeispiel sowie die Kodierregeln. Letztere erläutern, wie Textstellen den Kategorien zugeordnet werden, sodass eine systematische und nachvollziehbare Kodierung gewährleistet ist. Ein Auszug des Kodierleitfadens ist in Abb. 3 dargestellt.

Soziale Nachhaltigkeitsaktivitäten - Kodierleitfaden				
Hauptkategorie	**Unterkategorie**	**Definition**	**Ankerbeispiel**	**Kodierregeln**
Eigene Belegschaft	Sichere Beschäftigung	Langfristige Arbeitsplatzsicherung und Vermeidung von Arbeitslosigkeit.	"Hierzu gehören vor allem Qualifizierungs- und Umschulungsangebote für die Beschäftigten. Zudem ermöglicht das Unternehmen den Wechsel zwischen verschiedenen Standorten, um neue oder weiterhin dem Qualifikationsniveau entsprechende Tätigkeiten auszuüben."	Nennung von Aktivitäten zur langfristige Beschäftigungssicherung oder dem Erhalt von Arbeitsplätzen.
	Arbeitszeit	Zeit, in der ein Arbeitnehmer seine beruflichen Tätigkeiten verrichtet.	-	Nennung von Aktivitäten, die die Arbeitszeitregelungen beeinflussen.

Abb. 3: Auszug des Kodierleitfadens für die Kodierung von Informationen zu sozialen Nachhaltigkeitsaktivitäten (Quelle: Eigene Darstellung)

Das in Abb. 3 gezeigte Ankerbeispiel beschreibt, dass die Textstelle, welche Qualifizierungs- und Umschulungsangebote erwähnt, anhand der Kodierregel zur langfristigen Beschäftigungssicherung oder dem Erhalt von Arbeitsplätzen zählt und

folglich der Unterkategorie „sichere Beschäftigung“ innerhalb der Hauptkategorie „Eigene Belegschaft“ zugeordnet wird.

Im fünften Schritt werden die Analyseeinheiten festgelegt und die Berichte kodiert. Zu den Analyseeinheiten gehören die Kodiereinheit und die Kontexteinheit. Die Kodiereinheit ist der minimale Textbestandteil, der kodiert wird und ein Wort umfasst. Der größte Textbestandteil (Kontexteinheit), der verwendet wird, ist ein Absatz. Bei dieser Analyse werden ausschließlich die relevanten Teile der Nachhaltigkeitsberichterstattung nach den Vorgaben des CSR-RUG berücksichtigt. Hierbei werden zuerst die Geschäfts- und danach die Nachhaltigkeitsberichte kodiert. Informationen im Nachhaltigkeitsbericht, die bereits im Geschäftsbericht kodiert wurden, werden ausgelassen, um Duplikate zu vermeiden.

Die Besonderheit bei der Kodierung der sozialen Nachhaltigkeitsaktivitäten besteht darin, dass die Textabschnitte den Kategorien zugeordnet und zusätzlich in Schlüsselbegriffen zusammengefasst werden. Das Ziel besteht darin, dass bei der Auswertung neben der Unterkategorie auch konkrete soziale Nachhaltigkeitsaktivitäten genannt werden, da eine Unterkategorie verschiedene Aktivitäten umfassen kann. Dies erhöht den Detailgrad der Auswertung. Die Schlüsselbegriffe werden gebildet, indem der Inhalt der Textabschnitte in zusammenfassenden Worten verdichtet und repräsentiert wird.

Nachdem dieses Ablaufschema vollständig abgeschlossen ist, erfolgt die Auswertung und Interpretation der Inhaltsanalyse. Hierzu wird überprüft, welche Themen in der Unternehmens- und Nachhaltigkeitsstrategie behandelt werden und mit den sozialen Aktivitäten des jeweiligen Unternehmens übereinstimmen. Bei Übereinstimmung handelt es sich um strategiekonforme soziale Aktivitäten. Ist die soziale Aktivität nicht mit einer der Strategien konform, wird diese als nicht-strategische soziale Aktivität definiert. Um ein Maximum an Objektivität zu gewährleisten, führen drei unabhängige Personen diesen Prozess durch, vergleichen die Ergebnisse und passen sie bei Bedarf an.

IV Ergebnisse und Diskussion

1. Nicht-strategische soziale Aktivitäten

Zur Insgesamt berichten die DAX40-Unternehmen in ihren Geschäfts- und Nachhaltigkeitsberichten zum Geschäftsjahr 2023 über 1.286 verschiedene soziale Aktivitäten (vgl. Tab. 1). Von diesen Aktivitäten lassen sich 111 (9%) mit Zielen aus der Unternehmensstrategie begründen. Der Großteil der sozialen Aktivitäten (605; 47%) lässt sich mit Zielen aus der Nachhaltigkeitsstrategie begründen. Insgesamt werden 128 soziale Aktivitäten (10%) berichtet, die sowohl mit der Unternehmens- als auch mit der Nachhaltigkeitsstrategie übereinstimmen. Grds. wurden keine sozialen Aktivitäten berichtet, die gegen die Ziele der Unternehmens- oder Nachhaltigkeitsstrategie verstoßen. Ein illustratives Beispiel stellt die Hervorhebung von Diversitätsstrategien dar, obwohl gleichzeitig strukturelle Defizite bestehen, etwa in Form homogener Führungsteams, fortbestehender geschlechts- oder minderheitenbezogener Lohnunterschiede sowie fehlender inklusiver HR-Richtlinien.[54] Daraus lässt sich folgern, dass die Unternehmen teilweise sozial engagierter sind als es ihrem Ambitionsniveau in Bezug auf ihre Unternehmens- und Nachhaltigkeitsziele entspricht. Die nicht-strategischen sozialen Aktivitäten machen 34% der berichteten Aktivitäten aus.

Die Diskrepanz wirft grundlegende Fragen zur strategischen Einbettung und der beabsichtigten Wirkung der Veröffentlichung solcher nicht-strategischen sozialen Aktivitäten auf. Eine Möglichkeit ist, dass nicht alle Nachhaltigkeitsstrategien, aus denen die sozialen Aktivitäten abgeleitet wurden, in den Unternehmensberichten explizit genannt werden. Falls dies der Fall ist, kann dies als nachteilig betrachtet werden, da eine transparente und umfassende Berichterstattung über Strategien und konkrete Maßnahmen die Außenwirkung und Glaubwürdigkeit von Unternehmen stärkt.[55] Je vollständiger und spezifischer Unternehmen ihre Nachhaltigkeitsstrategien offenlegen, desto besser können Stakeholder die tatsächlichen Fortschritte und das strategische Engagement nachvollziehen.[56] In Nachhaltigkeitsstrategien muss außerdem ein integratives Nachhaltigkeitsverständnis verankert sein, über das vollumfänglich kommuniziert werden

[54] Vgl. Kalev et al., American Sociological Review 2006 S. 71589-71617.
[55] Vgl. Eccles/Ioannou/Serafeim, Management Science 2014 S. 2835-2857.
[56] Vgl. Cho/Laine/Roberts/Rodrigue, Accounting, Organizations and Society 2015 S. 78-94.

muss.[57] Eine unvollständige oder unspezifische Berichterstattung kann hingegen Zweifel an der Ernsthaftigkeit des Engagements wecken.

Wird über soziale Aktivitäten berichtet, obwohl kein Strategiebezug vorliegt, agieren Unternehmen ohne eine klare strategische Ausrichtung. Aus wissenschaftlicher Sicht gilt dies als wenig zielführend, denn Aktivitäten, die nicht mit den Unternehmenszielen und der übergeordneten Strategie übereinstimmen, sind ineffizient und zeugen von einem kurzfristigen Planungshorizont.[58] Alternativ kann es bedeuten, dass die durchgeführten sozialen Aktivitäten nicht auf ihre Zielkonformität geprüft werden. Dies geschieht, weil den Verantwortlichen entweder die strategische Zielsetzung nicht bekannt ist oder sie nicht ausreichend kommuniziert wurde.

In diesem Zusammenhang kommt auch der Aspekt des Greenwashing zum Ausdruck. Indem Unternehmen zahlreiche soziale Aktivitäten nennen, präsentieren sie sich nach außen hin nachhaltiger, als sie tatsächlich sind. In diesem Zusammenhang sind insb. die in der Literatur beschriebenen Phänomene „Decoupling“ (Entkopplung von Berichterstattung und tatsächlichem Handeln), „Fuzzy Reporting“ (unscharfe oder unpräzise Berichterstattung) und „Selective Disclosure“ (selektive Offenlegung von Informationen) zu beachten. Durch diese Praktiken können Unternehmen zwar zahlreiche soziale Aktivitäten auflisten, die jedoch keinen substanziellen Beitrag zur Nachhaltigkeitsentwicklung leisten oder in die Unternehmensstrategie integriert sind.[59]

Handlungsbedarf besteht sowohl bei nicht-strategischen sozialen Aktivitäten als auch bei Fällen von Greenwashing, bei denen Nachhaltigkeit lediglich vorgetäuscht wird. Unternehmen sollten daher ihre Nachhaltigkeitsstrategien explizit formulieren, transparent kommunizieren und sicherstellen, dass sämtliche sozialen Aktivitäten mit den Unternehmenszielen und der strategischen Ausrichtung übereinstimmen. Nur so können sie einen substanziellen Beitrag zur nachhaltigen Entwicklung leisten und das Vertrauen der Stakeholder nachhaltig stärken.

[57] Vgl. Zülch/Thun/Kayser/Schneider, ESGZ 3/2023 S. 44-49.
[58] Vgl. Porter/Kramer, Harvard Business Review 2011 S. 62-77.
[59] Vgl. Meyer/Rowan, American Journal of Sociology 1977 S. 340-363; Cho/Roberts/Patten, Accounting, Organizations and Society 2010 S. 431-443; Maroun, The British Accounting Review 2019 S. 199-216.

Ein weiterer kritischer Aspekt im Zusammenhang mit der Berichterstattung über nicht-strategische soziale Aktivitäten betrifft die Auswahl und den Charakter dieser Maßnahmen. Es stellt sich die Frage, ob ein erheblicher Teil der nicht-strategischen sozialen Aktivitäten sog. „Low Hanging Fruits“ sind – also Maßnahmen, die mit vergleichsweise geringem Ressourceneinsatz, minimalen Kosten und wenig organisatorischem Aufwand umgesetzt werden können.[60] Unternehmen könnten dazu neigen, solche leicht realisierbaren Aktivitäten gezielt auszuwählen und zu publizieren, um nach außen hin ein verstärktes soziales Engagement zu demonstrieren, ohne jedoch substanzielle Veränderungen oder langfristige Investitionen in soziale Nachhaltigkeit zu tätigen. Diese Praxis kann dazu führen, dass das berichtete soziale Engagement in einem Missverhältnis zum tatsächlichen Beitrag zur nachhaltigen Entwicklung steht.

Hinzu kommt, dass bestimmte soziale Aktivitäten, etwa im Bereich Arbeits- und Gesundheitsschutz, Diversität oder gesellschaftliches Engagement, bereits aufgrund gesetzlicher Vorgaben, branchenspezifischer Standards oder regulatorischer Auflagen verpflichtend sind. Die Berichterstattung über diese ohnehin einzuhaltenden Maßnahmen kann von Unternehmen genutzt werden, um das Ausmaß ihres sozialen Engagements in den veröffentlichten Berichten zu erhöhen, ohne dass sie damit einen über das gesetzliche Mindestmaß hinausgehenden Beitrag zur sozialen Nachhaltigkeit leisten. In der Literatur wird diese Praxis als „Box-Ticking“ bezeichnet. Dabei liegt der Fokus auf der Erfüllung formaler Anforderungen statt auf der tatsächlichen Wirkung und strategischen Verankerung der Maßnahmen.[61]

[60] Vgl. Struben/Kapmeier, System Dynamics Review 2023 S. 404-431.
[61] Vgl. Hahn/Lülfs, Journal of Business Ethics 2014 S. 401-420.

Branche	Gesamtanzahl Aktivitäten	Unternehmens- und Nachhaltigkeitsstrategie		Unternehmensstrategie		Nachhaltigkeitsstrategie		Freiwillige soziale Aktivitäten	
	N	n	in %	n	in %	n	in %	n	in %
Chemie, Pharma, Bio- und Medizintechnik	285	47	16%	30	11%	117	41%	91	32%
Finanzen	199	9	5%	1	1%	128	64%	61	31%
Handel und Konsum	133	15	11%	5	4%	66	50%	47	35%
Sonstiges	335	34	10%	44	13%	131	39%	126	38%
Technologie	197	14	7%	24	12%	98	50%	61	31%
Versorgung, Umwelt und Infrastruktur	137	9	7%	7	5%	65	47%	56	41%
Gesamt	**1286**	**128**	**10%**	**111**	**9%**	**605**	**47%**	**442**	**34%**

Tab. 1: Strategiekongruenz der berichteten sozialen Aktivitäten

Betrachtet man dieses Phänomen im Hinblick auf die verschiedenen Branchen, so zeigt sich ein deutlicher Unterschied bei den strategiekonformen sozialen Aktivitäten, die der Unternehmens- oder Nachhaltigkeitsstrategie zugeordnet werden können. So berichten Finanzunternehmen die wenigsten Aktivitäten, die mit der Unternehmensstrategie übereinstimmen (1%), und gleichzeitig die meisten Aktivitäten, die mit der Nachhaltigkeitsstrategie übereinstimmen (64%). Immerhin stehen 5% der berichteten sozialen Aktivitäten der Finanzunternehmen mit der Unternehmens- und Nachhaltigkeitsstrategie in Einklang. Ein Grund hierfür könnte sein, dass Finanzunternehmen ihre sozialen Aktivitäten gezielt an Nachhaltigkeitszielen ausrichten, etwa durch nachhaltige Finanzprodukte, Impact Investing oder Transparenzinitiativen. Solche Maßnahmen werden oft als Teil der Nachhaltigkeitsstrategie kommuniziert, während sie mit der klassischen Unternehmensstrategie, die weiterhin auf Rendite und Stabilität ausgerichtet ist, weniger direkt verbunden sind.

Die Chemie, Pharma, Bio- und Medizintechnik-Branche sowie die sonstigen Unternehmen weisen hingegen die geringste Diskrepanz in der Konformität ihrer sozialen Aktivitäten auf. So weisen die sozialen Aktivitäten der Chemie, Pharma, Bio- und Medizintechnik-Branche 11% Zielkonformität mit der Unternehmensstrategie und 41% mit der Nachhaltigkeitsstrategie und 16% mit beiden Strategien auf. Bei den sonstigen Unternehmen sind es 13% mit der Unternehmensstrategie, 39% mit der Nachhaltigkeitsstrategie und 10%

mit beiden Strategien. Dies kann darauf zurückzuführen sein, dass Nachhaltigkeit und soziale Verantwortung in diesen Branchen zunehmend als integraler Bestandteil der Unternehmensstrategie verstanden werden. Insb. in der Chemie- und Pharmaindustrie ist Nachhaltigkeit kein Zusatzprojekt, sondern wird durch regulatorische Vorgaben, gesellschaftlichen Druck und Innovationserfordernisse direkt in die Unternehmensstrategie integriert.[62] Zudem sind viele Unternehmen dieser Branchen stark innovationsgetrieben und sehen in nachhaltigen Technologien und sozialen Aktivitäten einen Wettbewerbsvorteil.[63] Die Integration von Nachhaltigkeitszielen in die Unternehmensstrategie wird dadurch erleichtert, dass nachhaltige Innovationen – etwa in der Wirkstoffentwicklung oder der Medizintechnik – direkt zum Unternehmenserfolg beitragen.[64]

2. Themenschwerpunkte sozialer Aktivitäten

Bei der Gruppierung der Themenschwerpunkte der sozialen Aktivitäten zeigt sich, dass der thematische Schwerpunkt bei Maßnahmen im Bereich Eigene Belegschaft liegt (866 von 1.286 Aktivitäten, vgl. Tab. 2). Dies deckt sich mit den Ergebnissen der Praxisstudie zur Nachhaltigkeitsberichterstattung nach CSRD/ESRS von DRSC/Deloitte (2025).[65] In dieser Studie wurden die Themen Eigene Belegschaft und Klimaschutz als die wichtigsten Standards innerhalb des ESRS identifiziert. Daher ist es naheliegend, dass Unternehmen vermehrt Aktivitäten in diesen Themenbereichen durchführen und publizieren.

52% dieser Aktivitäten lassen sich mit der Nachhaltigkeitsstrategie begründen, 9% mit der Unternehmensstrategie und 10% mit beiden Strategien. Den Rest (29%) machen nicht-strategische soziale Aktivitäten aus. Dieses Ergebnis ist wenig überraschend, da die Unternehmen in diesem Bereich den größten Einfluss haben, einige Aktivitäten zum Teil gesetzlich verankert sind (z.B. Gesundheit und Sicherheit oder Gleichstellung) und andere

[62] Vgl. Bundesministerium für Wirtschaft und Energie, Handlungspakt Chemie- und Pharmastandort Deutschland, 2021, s.u. https://fmos.link/14939 (Abruf: 11.03.2026).
[63] Vgl. Kellermann/Meincke/Renz/Gocke/Kurth/Morawietz/Navah, Studie zum Industriestandort Deutschland. Verband der Chemischen Industrie e. V. (VCI) & The Boston Consulting Group (BCG), 2024, s.u. https://fmos.link/14940 (Abruf: 11.03.2026).
[64] Vgl. Attar/Bertenrath/Conventz/Lichtblau/Richter/Rigall/Schleiermacher/Schmitt/Tarlatt, Innovationen den Weg ebnen: Eine Studie von IW Consult und SANTIAGO für den Verband der Chemischen Industrie. Verband der Chemischen Industrie e. V. (VCI), 2015, s.u. https://fmos.link/14941 (Abruf: 11.03.2026).
[65] Deloitte/DRSC, Die Praxis der Nachhaltigkeitsberichterstattung nach CSRD/ESRS, 2025, s.u. https://fmos.link/14235 (Abruf: 11.03.2026).

der Geschäftsentwicklung und somit den wirtschaftlichen Interessen dienen (z.B. Schulungen und Kompetenzentwicklung).

Mit 242 von 1.286 Aktivitäten (19%) stellen die Aktivitäten zu den betroffenen Gemeinschaften die zweitgrößte Gruppe dar. Die geringste Anzahl der berichteten sozialen Aktivitäten entfällt auf die Kategorien Arbeitskräfte in der Wertschöpfungskette und Verbraucher und Endnutzer. Überraschend ist insb. das Ergebnis für die Kategorie Verbraucher und Endnutzer, da diese wichtige Zielgruppe von den Unternehmen nur wenig beachtet wird. Auffällig ist zudem, dass die sozialen Aktivitäten in beiden Kategorien überwiegend nicht-strategische soziale Aktivitäten umfassen. Bei den Arbeitskräften in der Wertschöpfungskette sind es 49% und bei den Verbrauchern und Endnutzern 50%. Somit stehen die meisten Tätigkeiten in diesen Kategorien nicht im Einklang mit der Unternehmens- oder Nachhaltigkeitsstrategie. Möglicherweise betrachten die Unternehmen diese Aktivitäten nicht als Bestandteil ihrer Strategie, führen die Tätigkeiten aber aus, da sie zu einem positiven Bild in der Presse und bei den Verbrauchern führen oder es sich dabei um Marketingaktivitäten handelt („Social Washing“ in Anlehnung an Greenwashing).

Ober- und Unterkategorie	Aktivitäten gesamt	Unternehmens- und Nachhaltigkeitsstrategie		Unternehmensstrategie		Nachhaltigkeitsstrategie		Freiwillige soziale Aktivitäten	
	N	n	in %	n	in %	n	in %	n	in %
Arbeitskräfte in der Wertschöpfungskette	**96**	**11**	**11%**	**8**	**8%**	**30**	**31%**	**47**	**49%**
Arbeitsbedingungen	94	11	12%	8	9%	30	32%	45	48%
Gleichbehandlung und Chancengleichheit für alle	2	0	0%	0	0%	0	0%	2	100%
Betroffene Gemeinschaften	**242**	**20**	**8%**	**12**	**5%**	**103**	**43%**	**107**	**44%**
Besondere Rechte indigener Völker	1	0	0%	0	0%	0	0%	1	100%
Bürgerliche und politische Rechte von Gemeinschaften	4	1	25%	1	25%	0	0%	2	50%
Wirtschaftliche und soziale Rechte von Gemeinschaften	237	19	8%	11	5%	103	43%	104	44%
Eigene Belegschaft	**866**	**90**	**10%**	**81**	**9%**	**448**	**52%**	**247**	**29%**
Angemessene Entlohnung	54	4	7%	4	7%	25	46%	21	39%
Beschäftigung und Inklusion von Menschen mit Behinderungen	16	2	13%	0	0%	11	69%	3	19%
Gesundheit und Sicherheit	190	24	13%	8	4%	99	52%	59	31%
Gleichstellung der Geschlechter und gleicher Lohn für gleiche Arbeit	11	2	18%	0	0%	8	73%	1	9%
Schulungen und Kompetenzentwicklung	244	24	10%	37	15%	139	57%	44	18%
Sichere Beschäftigung	20	3	15%	0	0%	7	35%	10	50%
Sozialer Dialog	42	3	7%	5	12%	17	40%	17	40%
Tarifverhandlungen	1	0	0%	1	100%	0	0%	0	0%
Vereinbarkeit von Berufs- und Privatleben	112	9	8%	3	3%	40	36%	60	54%
Vereinigungsfreiheit, Betriebsräten	15	1	7%	2	13%	5	33%	7	47%
Vielfalt	161	18	11%	21	13%	97	60%	25	16%
Verbraucher und Endnutzer	**82**	**7**	**9%**	**10**	**12%**	**24**	**29%**	**41**	**50%**
Informationsbezogene Sicherheit	31	0	0%	0	0%	6	19%	25	81%
Persönliche Sicherheit	46	7	15%	7	15%	17	37%	15	33%
Soziale Inklusion	5	0	0%	3	60%	1	20%	1	20%
Gesamtergebnis	**1286**	**128**	**10%**	**111**	**9%**	**605**	**47%**	**442**	**34%**

Tab. 2: Themen der berichteten sozialen Aktivitäten

Bei der Betrachtung der Konformität der berichteten sozialen Aktivitäten mit der Unternehmensstrategie fällt auf, dass sich die Kategorien kaum voneinander unterscheiden. Einzig die Kategorie Betroffene Gemeinschaften ist weniger durch die Unternehmensstrategie begründet als die anderen Kategorien. Bei der Nachhaltigkeitsstrategie ist die Konformität der berichteten sozialen Aktivitäten deutlich differenzierter. So sind 52% der Aktivitäten zur Eigenen Belegschaft mit der Nachhaltigkeitsstrategie vereinbar, bei den Verbrauchern und Endnutzern sind es hingegen nur 29%. Diese Unterschiede können auf die Einflusssphären der Unternehmen in ihren Strategien zurückzuführen sein. Soziale Aktivitäten gelten insb. aufgrund des Begriffs „ESG“ als nachhaltig, weshalb der Schwerpunkt in der Nachhaltigkeitsstrategie nicht überraschend ist. Der Fokus auf die Eigene Belegschaft ist aus den zuvor gemachten Äußerungen begründbar. Fraglich ist jedoch, inwiefern die Schwerpunkte der Berichterstattung über soziale Aktivitäten aus den strategischen Schwerpunkten resultieren und welchen Einfluss die zum Zeitpunkt der Erstellung der Nachhaltigkeitsberichte noch zu erwartende Nachhaltigkeitsberichterstattung nach CSRD und die zugehörige Datenverfügbarkeit spielen.

V Handlungsempfehlungen

Die Ergebnisse zeigen, dass bei einem Drittel der sozialen Aktivitäten der DAX40-Unternehmen eine Diskrepanz zwischen deren und der Unternehmens- sowie Nachhaltigkeitsstrategie besteht. Selbst wenn über soziale Aktivitäten in den Geschäfts- oder Nachhaltigkeitsberichten berichtet wird, kann dies nach außen als reines „Greenwashing" wahrgenommen werden. Unternehmensaktivitäten sollten daher nicht isoliert betrachtet, sondern konsequent auf die übergeordnete Strategie ausgerichtet werden. Um dies sicherzustellen, reicht es nicht aus, ausschließlich auf Ebene der Unternehmensstrategie anzusetzen. Der Aspekt der sozialen Nachhaltigkeit muss vielmehr bereits im Unternehmensleitbild verankert sein, da dieses als normativer Orientierungsrahmen fungiert und grundlegende Werte sowie den angestrebten gesellschaftlichen Beitrag des Unternehmens definiert.

Aus dem Leitbild sind konkrete Leitziele abzuleiten, die soziale Zielsetzungen explizit berücksichtigen. Diese Ziele dienen als verbindliche Handlungsmaximen für alle strategischen und operativen Ebenen und sichern damit die strategische Kohärenz. Die Integration sozialer Leitziele fördert die Ausrichtung der Mitarbeitenden auf gesellschaftliche Verantwortung und stärkt das Vertrauen externer Stakeholder. Eine klare Zielformulierung ermöglicht zudem eine spätere Erfolgsmessung und bildet die Grundlage für ein systematisches Nachhaltigkeitsmanagement und -controlling.

Auf Basis der Leitziele sind im nächsten Schritt sowohl eine externe Umweltanalyse (Makro- und Mikroumwelt) als auch eine strategische Unternehmensanalyse durchzuführen. Bei der Makroumweltanalyse sind insb. gesellschaftliche Trends, demografische Entwicklungen, regulatorische Rahmenbedingungen sowie die Erwartungen relevanter Anspruchsgruppen in Bezug auf soziale Verantwortung zu berücksichtigen. In der Mikroumweltanalyse sollten Wettbewerbsvergleiche auch die sozialen Aktivitäten von Mitbewerbern einbeziehen. Im Rahmen der internen Analyse gilt es, bestehende soziale Strukturen, Programme, die Unternehmenskultur und die Mitarbeiterzufriedenheit systematisch zu erfassen. Nur durch diese umfassende Analyse können realistische, relevante und umsetzbare soziale Strategien entwickelt werden.

Auf Grundlage der analysierten Informationen lässt sich eine ganzheitliche Unternehmensstrategie mit integrierten sozialen Komponenten formulieren, bewerten und umsetzen. Alternativ – oder ergänzend – bietet sich die Entwicklung einer eigenständigen Sozialstrategie an, die sich ausschließlich auf die Steuerung und Weiterentwicklung sozialer Themen konzentriert. Die Sozialstrategie ermöglicht eine fokussierte Ableitung und Umsetzung sozialer Maßnahmen. Auch die gezielte Integration einer Sozialstrategie als Bestandteil der Nachhaltigkeitsstrategie ist möglich. Gleichwohl ist sicherzustellen, dass diese Sozialstrategie nicht losgelöst, sondern in voller Übereinstimmung mit der übergeordneten Unternehmensstrategie steht, um Zielkonflikte zu vermeiden und Synergien zu nutzen.

Zur systematischen Überprüfung und Steuerung sozialer Maßnahmen empfiehlt sich die Entwicklung eines spezifischen Performance-Measurement-Systems. Ein solches System sollte sowohl qualitative als auch quantitative Indikatoren umfassen, um den Zielerreichungsgrad sowie die Wirksamkeit der Aktivitäten messbar zu machen. Mögliche Kennzahlen könnten z.B. die Mitarbeiterzufriedenheit, Diversity-Quoten, die Anzahl der Weiterbildungsstunden oder das gesellschaftliche Engagement umfassen. Entscheidend ist, dass das Messsystem nicht nur der Kontrolle, sondern auch der kontinuierlichen Verbesserung und strategischen Weiterentwicklung dient.

Dieser Prozess sollte im Rahmen des strategischen Planungszyklus regelmäßig überprüft und angepasst werden. Nur durch eine wiederkehrende Evaluation kann sichergestellt werden, dass soziale Aspekte langfristig in der Unternehmenssteuerung verankert bleiben, auf neue Herausforderungen reagiert wird und eine nachhaltige Wertschöpfung i.S. aller Stakeholder gelingt. Die regelmäßige Reflexion ermöglicht zudem die rechtzeitige Identifikation von Wirkungslücken und die Ableitung gezielter Maßnahmen zur Verbesserung der sozialen Unternehmensleistung.

VI Fazit und Ausblick

Die Verankerung der sozialen Aktivitäten von Unternehmen sollte idealerweise konsistent zur Strategie sein und ein Teil davon werden. Unternehmen können dabei bestimmte Ziele definieren und diese in ihrer Unternehmensstrategie verankern. Dies lässt sich im Rahmen eines Strategiebaums auch in einer untergeordneten Nachhaltigkeitsstrategie abbilden, in der detaillierter auf diese Dimension eingegangen werden kann.

Die Ergebnisse zeigen, dass bei einem Drittel der sozialen Aktivitäten der DAX40-Unternehmen eine Diskrepanz zwischen deren und der Unternehmens- sowie Nachhaltigkeitsstrategie besteht. Der Fokus liegt dabei allerdings auf den Aktivitäten zur eigenen Belegschaft. Bei einem Drittel der Aktivitäten ist die strategische Einordnung hingegen unklar. In diesen Fällen fehlen operationalisierte Ziele, klare Steuerungsgrößen oder eine systematische Rückführung auf die übergeordneten strategischen Leitplanken. Hier stellt sich die Frage, ob diese Maßnahmen einen strategischen Mehrwert generieren oder eher als symbolische Maßnahmen zu interpretieren sind.

Um ihre Glaubwürdigkeit zu stärken, müssen Unternehmen soziale Aktivitäten als essenziellen Bestandteil ihrer Kommunikation und ihres Kerngeschäfts begreifen. Dazu sind weiterentwickelte Steuerungsinstrumente erforderlich, die eine Verankerung in der Strategie, den Zielsystemen und den Anreizstrukturen des Managements sicherstellen. Der vorgelegte RefE, der eine 1:1-Umsetzung der CSRD sowie der Stop-the-Clock-RL vorsieht, und der RegE, der insb. Übergangsregelungen und gestaffelte Berichtspflichten enthält, verstärken diesen Handlungsdruck zusätzlich.

Diese Entwicklungen verdeutlichen, dass der Gesetzgebungsdruck spürbar zunimmt. Für Unternehmen bedeutet dies, dass sie in den kommenden Jahren stärker in die Pflicht genommen werden und ihre sozialen Aktivitäten im Rahmen der Nachhaltigkeitsberichterstattung nicht nur beschreibend, sondern systematisch, messbar und strategisch fundiert darstellen müssen. Perspektivisch wird die klare Verknüpfung sozialer Maßnahmen mit der langfristigen Unternehmensstrategie, den Governance-Strukturen und den Anreizsystemen des Managements somit zu einer zentralen Erwartung. Unternehmen, die frühzeitig entsprechende Ziele und Kennzahlen entwickeln, können regulatorische

Risiken verringern und zugleich ihre Position gegenüber Investoren, Mitarbeitenden und weiteren Stakeholdern nachhaltig stärken.

Sustainability Scores as Labor Market Signals: Experimental Evidence on Employer Attractiveness and Wage Concessions

Beitrag 3

Sustainability Scores as Labor Market Signals: Experimental Evidence on Employer Attractiveness and Wage Concessions

Abstract

As compliance with the Corporate Sustainability Reporting Directive (CSRD) becomes increasingly costly, organizations are seeking to derive strategic value from the sustainability information they are required to disclose. This preregistered study examines whether displaying numerical sustainability scores in job postings is associated with changes in employer choice and applicants' willingness to accept lower relative compensation. A large-scale forced-choice employer selection experiment was conducted among 2,781 German working-age adults, generating 16,686 employer choice observations. Participants evaluated realistic job postings in repeated forced-choice tasks, with sustainability scores absent in the control condition and displayed at varying score differences in the followed treatment condition.

Results demonstrate that the mere presence of sustainability information increased applicants' willingness to accept relative wage concessions. Additional increases in sustainability score magnitude further strengthened wage concession behaviour, although to a substantially smaller extent. Sustainability preferences influenced employer evaluations but showed limited effects on monetary trade-offs. Furthermore, applicants assigned strongest importance to social sustainability dimensions, particularly work conditions and health and safety. These findings provide experimental evidence that numerical ESG information can influence employer choice and accepted relative wage concessions. They suggest that sustainability disclosures may serve not only as compliance instruments but also as strategic employer signals within recruitment contexts.

Keywords: Sustainability disclosure; ESG scores; employer choice; employer attractiveness; wage concessions; applicant preferences; forced-choice experiment

1. Introduction

Corporate sustainability has emerged as a critical determinant of employer attractiveness, with job seekers increasingly prioritizing companies demonstrating environmental, social, and governance0F[66] (ESG) responsibility (Turban & Greening, 1997; Backhaus et al., 2002). As a result, companies are increasingly striving to position themselves as sustainable employers to remain competitive and attract a larger pool of talented individuals (Story et al., 2016). Although these regulations do not require companies to calculate or disclose standardized ESG scores, they increase the availability, structure, and comparability of sustainability-related information. Such information can subsequently be assessed and aggregated by external data providers, rating agencies, investors, or other intermediaries to develop proprietary ESG scores and related sustainability indicators. The associated reporting and compliance requirements may impose substantial costs on companies (European Commission, 2023; PwC, 2024), creating incentives to leverage the resulting sustainability information strategically. One underexplored avenue is talent acquisition. Communicating concise ESG indicators in job postings may enhance employer attractiveness and potentially reduce recruitment costs, time-to-hire, and reliance on salary premiums, thereby allowing firms to derive additional strategic value from sustainability-related reporting investments (Krueger et al., 2023).

Prior research shows that corporate social performance can enhance employer attractiveness, particularly among job seekers with greater employment choice (Turban & Greening, 1997; Albinger & Freeman, 2000; Greening & Turban, 2000), and that mission-oriented organizational attributes, corporate social responsibility messages, and social impact framing can influence job preferences and compensation demands (Burbano, 2016; Hussain et al., 2024; Non et al., 2022). However, this literature has primarily examined broad corporate social performance, narrative mission cues, or social impact framing rather than numerical sustainability information embedded directly in job postings. Prior research has also not experimentally distinguished whether applicants respond primarily to the mere presence of such numerical sustainability signals or to differences in their magnitude. Unlike Backhaus et al. (2002), who relied on general CSP rankings, this study examines quantifiable ESG-related sustainability scores in a controlled forced-choice setting. It thereby separates

[66] Throughout this paper, the term “governance” refers specifically to corporate governance.

the effects of score presence and score magnitude and additionally examines whether applicants' individual ESG priorities condition these responses. This study addresses these gaps through four research questions:

- RQ1: Does the presence of sustainability scores influence employer choice behaviour and applicants' willingness to accept lower relative wages compared to comparable job postings without sustainability information?
- RQ2: Does a higher sustainability score reduce applicants' salary demands (willingness to accept a pay cut)?
- RQ3: Which ESG aspect drives applicants' willingness to forgo salary for sustainability?
- RQ4: Within ESG aspects, which sub-criteria do applicants prioritize most?

Using a large-scale online forced-choice experiment, this paper provides new evidence on how numerical sustainability scores relate to employer-choice and wage-concession decisions. Its contributions are threefold. First, it distinguishes between differences associated with the disclosure of sustainability scores and incremental variation associated with score magnitude. Second, it identifies applicants' relative priorities across ESG dimensions and sub-criteria. Third, it provides evidence on the potential recruitment relevance of sustainability information generated in the context of sustainability-reporting requirements.

Section 2 develops the theoretical foundations and hypothesis development. Section 3 details the research design and methodology. Section 4 presents the empirical results. Section 5 discusses theoretical and practical implications, limitations, and future research directions. Finally, Section 6 concludes the study.

2. Theoretical Background and Hypotheses Development

2.1 Sustainability Signalling in Job Postings

Organizations increasingly communicate their sustainability engagement not only to investors and customers but also to potential employees. Job postings constitute a strategic communication device through which companies signal organizational values, priorities, and long-term orientation to labor market participants. From a theoretical perspective, sustainability-related information in job postings can be understood as a form of sustainability signalling that reduces information asymmetry between employers and job seekers. In doing so, it positions the company as a high-quality, attractive employer, thereby enhancing employer attractiveness and increasing both the number and the quality of applications.

The theoretical foundation of this sustainability signalling in job postings rests primarily on signalling theory (Spence, 1973). Briefly, signalling theory focuses on the communication of information (signal) by a sender (signaller) to an outsider (receiver) (Connelly et al., 2011). The signaller demonstrates an insider of an organization who possesses information about an individual (e.g., Spence, 1973), product (e.g., Kirmani & Rao, 2000), or organization (e.g., Ross, 1977) that is not available to outsiders. The signal represents positive or negative private information to convey organizational attributes (e.g, Connelly et al., 2011). This process reduces information asymmetry between the signaller and the receiver (Spence, 2002). Additionally, receivers interpret the signal and incorporate it into their decisions (Basuroy et al., 2006).

Signalling theory thereby identifies two chief characteristics of efficacious signals. First, signal observability refers to the extent to which outsiders can readily notice the signal. If actions taken by insiders are not easily observed by outsiders, they cannot effectively communicate with receivers. Second, signal costliness ensures credibility (Bird & Smith, 2005). In the signalling context, costs mean that some signallers are better positioned than others to bear these expenses, creating differentiation among senders. Receivers are outsiders who lack complete information about an organization and therefore seek and interpret observable signals to reduce this information asymmetry (Bird & Smith, 2005).

The effectiveness of the signal depends on source credibility and interpretation of the signal by the receiver (Cohen & Dean, 2005; Busenitz et al., 2005). Signalling effectiveness can be enhanced by sending more observable signals or increasing the number of signals (Janney & Folta, 2003). When applicants receive incongruent information about an employer, they must reconcile competing signals, which can complicate employer evaluations and reduce perceived employer attractiveness (Pernkopf et al., 2021). To facilitate more efficient signalling, receivers can send feedback in the form of countersignals (e.g., Gupta et al., 1999). Receivers desire information about signallers, but signallers also desire information about receivers so that they may know which signals are most reliable, to which signals receivers are paying the most attention, and how receivers are interpreting signals. Signallers that heed such countersignals can adapt future signals to improve reliability (Gulati & Higgins, 2003). In the same way that receiver attention can improve the signalling process, signaller attention to countersignals can also result in more efficient signalling, particularly in an iterative or sequential bargaining context (Ramaswami & Srivastava, 2001). Others have noted how some receivers interpret signals differently than others do (Perkins & Hendry, 2005; Ramaswami & Srivastava, 2001).

Given this description of signalling theory, it is easy to see the crucial role of signalling theory in influencing recruitment outcomes (Ahamad et al., 2023). Labor markets are characterized by substantial information asymmetry, where applicants confront uncertainty regarding unobservable organizational attributes such as corporate culture, ethical standards, strategic orientation and more (Spence, 1973). Companies may address this information gap by presenting observable cues in job postings that allow applicants to form inferences about otherwise difficult-to-assess organizational characteristics.

Numerical sustainability scores are conceptualized as signals within the present study. In a general recruitment context, the signal comprises sustainability information communicated by a recruiting organization, while prospective applicants act as receivers who observe and interpret that information. Receiver responses may subsequently take forms such as applying for a position, not responding to a job posting, or expressing a preference for one employer over another. Fig. 1 provides a general conceptual illustration of this recruitment-signalling process. It is not intended to depict the specific sequence or outcome measures of the present experiment.

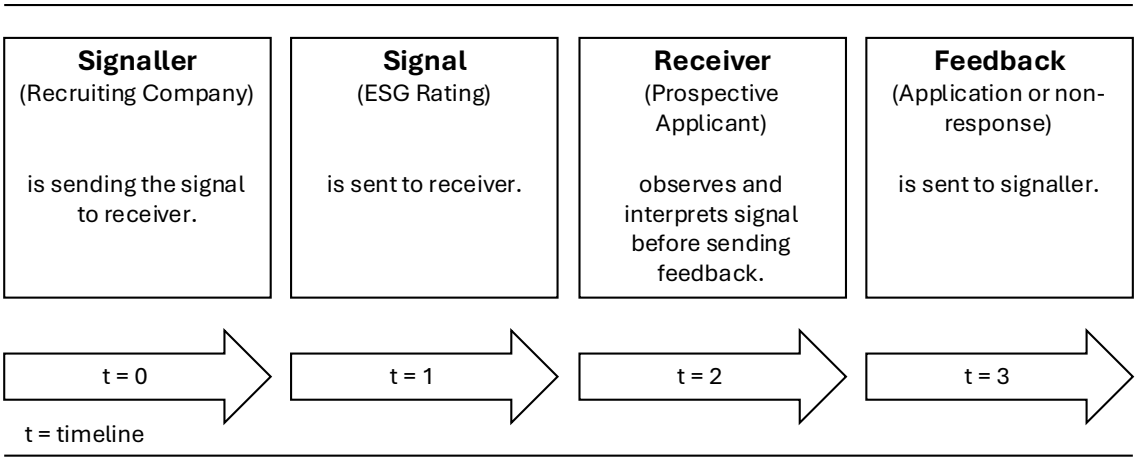


Fig. 1. General conceptual signalling process in a recruitment context.

This framework aligns with foundational signalling models distinguishing high-quality from low-quality companies (Kirmani & Rao, 2000). Signal observability, a necessary condition for efficacy (Connelly et al., 2011), is optimized in job postings, representing applicants' initial formal interaction with companies. Compared with lengthy and multidimensional sustainability disclosures, standardized sustainability ratings may provide salient and readily interpretable summary cues that facilitate comparisons between alternatives and reduce the amount of information that decision-makers must process (Lurie, 2004; Hartzmark & Sussman, 2019).

Beyond simple signal presence, numerical sustainability disclosures may influence applicants through two theoretically distinct mechanisms. First, disclosure presence may function as an initial signal reducing information asymmetry and increasing organizational attractiveness by making sustainability efforts observable during employer evaluations. Once sustainability information becomes visible, applicants may incorporate sustainability considerations into employer evaluations that otherwise remain difficult to assess during early recruitment stages. Second, disclosure magnitude may provide additional differentiation once sustainability information becomes cognitively salient. After sustainability information is recognized and integrated into employer evaluations, variations in sustainability performance levels may exert incremental effects by enabling finer distinctions between competing employers. Consequently, sustainability disclosures may influence applicants not only through the existence of sustainability information itself but additionally through numerical variation in sustainability performance once sustainability considerations become salient during employer evaluation processes.

Accounting research demonstrates that sustainability disclosures reduce information risk and enhance stakeholder trust (Dhaliwal et al., 2011; Cheng et al., 2014). Extending this logic to recruitment, ESG scores signal superior governance, long-term orientation, and ethical commitment. These attributes are increasingly valued by purpose-driven applicants (Turban & Greening, 1997). Unlike investor-focused financial signals, sustainability metrics simultaneously address environmental, social, and governance dimensions, broadening informational content (Eccles et al., 2014).

From the receiver perspective, emphasized in OB/HR signalling research (Rynes, 1991), applicants interpret scores through heterogeneous lenses. Pro-social candidates prioritize environmental and social dimensions; others emphasize governance transparency (Greening & Turban, 2000). When different elements of organizational communication convey congruent messages, signal consistency may strengthen the clarity and credibility of sustainability-related claims, whereas conflicting signals can make those claims more difficult for receivers to interpret (Gao et al., 2008; Moratis, 2018). By embedding sustainability scores in job postings, companies may make otherwise peripheral reputational attributes more salient during applicants' employer evaluations.

2.2 Employer Attractiveness and Wage Expectations

Employer attractiveness reflects the perceived desirability of an organization as a place to work and constitutes a central determinant of applicant behaviour in competitive labor markets. Research in organizational behaviour defines employer attractiveness as the anticipated benefits that a potential employee associates with working for a specific organization (Berthon et al., 2005). Organizational attractiveness has also been conceptualized as the overall affective evaluation of an organization as a desirable place to work (Highhouse et al., 2003). As labor markets have become increasingly competitive, understanding the factors that influence applicants' organizational preferences has become a key topic within recruitment and organizational behaviour research (Chapman et al., 2005). The factors that influence an applicant's job choice have therefore been the focus of extensive empirical research (Chapman et al., 2005).

Research by Judge and Bretz (1992) suggests that a job which is congruent with a candidate's values and priorities influences their job choice. More broadly, organizational characteristics act as signals that allow applicants to infer information about working conditions,

organizational culture, and potential career opportunities under conditions of incomplete information (Judge & Cable, 1997). When evaluating a job opportunity, candidates assess a variety of attributes simultaneously, including perceived job fit (Carless, 2005), alignment between personal and organizational values (Judge & Cable, 1997), employer brand reputation (Collins, 2002), organizational social responsibility (Jones et al., 2014), and working conditions such as flexibility (Peiró et al., 2002). Research has shown that how specific job characteristics are communicated and prioritized during the recruitment process can significantly impact job selection decisions (Newman et al., 2026; Rynes et al., 1980). Selecting a job offer is therefore a complex decision-making process influenced by a variety of job features and attributes that candidates consider important (Chapman et al., 2005). Meta-analytic evidence further confirms that organizational attributes, recruiter behaviour, and job characteristics systematically influence applicant attraction and job choice decisions (Uggerslev et al., 2012). Job candidates prioritize different job characteristics when evaluating potential job offers. The significance of these features can vary based on individual preferences, career goals, labor market conditions, and broader societal trends (Solnet et al., 2012).

Empirical evidence further indicates that corporate reputation, ethical conduct, and social performance significantly influence organizational attractiveness and application intentions. (Turban & Greening, 1997; Greening & Turban, 2000). These findings suggest that applicants incorporate information about corporate social responsibility (CSR) when evaluating potential employers. More recent work further shows that job seekers actively incorporate CSR-related information into their employer evaluations and use sustainability signals when forming perceptions of organizational attractiveness (Jones et al., 2014). Sustainability initiatives may therefore serve as informational cues that allow applicants to infer organizational values and priorities. Consequently, sustainability signalling may have theoretically ambiguous effects on employer attractiveness.

Compensation can also play a significant role in recruitment and employer attractiveness (Ho et al., 2009; Uggerslev et al., 2012). Higher compensation and attractive employee benefits can increase the perceived attractiveness of job opportunities and support organizations in attracting prospective applicants (Newman et al., 2026). Although human resource managers sometimes perceive pay as an over-reported motivator, empirical evidence suggests that compensation remains a central determinant of job choice and

employee retention (Rynes et al., 2004). Pay has also been found to be a statistically significant motivator in attracting highly skilled workers who often face multiple employment opportunities (Dal Bó et al., 2013). More recent labor market evidence further supports the importance of wage expectations in job mobility decisions. A survey of 2,800 job seekers found that 79.00% of respondents believed they could earn more by switching employers, highlighting the central role of competitive salaries in the recruitment process (Perna, 2022).

In the context of this study, employer attractiveness is not merely an attitudinal construct but an economically consequential perception that shapes both job choice and wage expectations. Bringing these perspectives together, employer attractiveness plays a dual role in shaping labor market outcomes. It directly influences employer choice by affecting the perceived desirability of an organization. Understanding how sustainability signals influence both employer attractiveness and wage expectations is therefore essential for explaining applicant behaviour in contemporary labor markets.

2.3 Sustainability preference heterogeneity and Trade-Offs Between Pay and Purpose

While Sections 2.1 and 2.2 conceptualize sustainability information in job postings as a signal that affects employer attractiveness and wage expectations at the aggregate level, individual heterogeneity in preferences is likely to condition these effects. Applicants differ systematically in the extent to which they value pro-social impact relative to monetary compensation. This section develops the theoretical argument that sustainability preference heterogeneity shapes the trade-off between pay and purpose in the presence of sustainability signals. Standard labor supply models assume that individuals maximize utility as a function of income and leisure. However, a large body of research in economics and management demonstrates that many individuals derive utility not only from monetary payoffs but also from contributing to social or environmental goals (Thomas, 2017; Non et al., 2022).

Theoretical models of motivated agents posit that workers with pro-social or mission-oriented preferences experience intrinsic utility from advancing a valued cause (Besley & Ghatak, 2005). When the organization's mission aligns with individual values, motivation increases and monetary incentives become relatively less central. This "mission-matching" logic implies that workers with strong sustainability preference heterogeneity self-select into organizations whose objectives reflect their own social concerns. Empirical evidence

supports this view. Field and experimental studies show that individuals are willing to accept lower wages to work for organizations with a social or environmental mission (Burbano, 2016; Besley & Ghatak, 2017). In such cases, sustainability-related attributes may partially substitute for financial compensation because employees derive intrinsic utility from contributing to organizations with positive societal impact. Accounting research documents that companies with strong sustainability performance often exhibit superior governance structures, stronger long-term orientation, and lower risk profiles (Dhaliwal et al., 2011; Eccles et al., 2014). If applicants interpret sustainability signals as indicators of superior organizational quality, they may expect such companies to offer higher wages consistent with their perceived performance and financial strength. Experimental evidence also indicates that a subset of workers deliberately selects mission-oriented jobs even when these offer lower financial rewards, highlighting the importance of pro-social motivation in labor market decisions (Fehrler & Kosfeld, 2014). Together, these findings suggest that heterogeneity in sustainability preferences systematically affects labour-market decisions.

Building on these theories, this study proposes that sustainability preference heterogeneity conditions the relationship between sustainability signals and economic decision outcomes. Specifically, sustainability information should increase employer attractiveness more strongly for applicants with high pro-social orientation. Furthermore, such applicants should be more willing to accept lower wages in exchange for employment at a sustainability-oriented company.

2.4 Development of Hypotheses

Building on the theoretical foundations established above, three hypotheses are developed to directly address RQ1, RQ2, and the anticipated moderating role of sustainability preference heterogeneity (RQ3–RQ4). These hypotheses translate the signalling logic and wage trade-off mechanisms into empirically testable predictions.

- H1 (derived from RQ1): Participants exposed to job postings with sustainability scores accept greater relative wage concessions (as a percentage of their stated minimum salary expectation) than participants exposed to otherwise comparable job postings without sustainability scores.
- H2 (derived from RQ2): Among participants exposed to sustainability scores, willingness to accept a pay cut increases with score magnitude.

- H3 (derived from RQ3, RQ4 and pro-social moderation): The positive effects of sustainability scores on employer choice and wage concessions (H1 and H2) are moderated by the relative importance assigned to environmental, social, and governance aspects.

3. Research Design and Method

3.1 Overall Research Design and Experimental Setup

The present study employs a large-scale online experiment to examine whether quantified sustainability score disclosures in job postings influence employer attractiveness and applicants' wage trade-offs. The experiment follows a repeated within-subject experimental design with randomized task characteristics with two primary conditions: a control condition (no sustainability score disclosed) and a treatment condition (sustainability score disclosed).

To mitigate social desirability bias and demand effects, participants were initially informed that the study investigates only how the composition and formulation of short job postings influence employer attractiveness. The specific focus on sustainability score disclosure was revealed only at the end of the experiment. This procedure was implemented to reduce the likelihood that participants would consciously adjust responses toward socially desirable behaviour once sustainability considerations became salient.

3.2 Sample and Data Collection

The target population consisted of working-age adults (18 years and older, not retired) residing in Germany, with sufficient proficiency in German. A diverse quota sample (N = 8,044) was recruited through a professional online panel provider. Participants were pre-screened based on the defined criteria to ensure relevance and representativeness, thereby mitigating self-selection biases that are common in university-based samples. The survey was designed and administered using Qualtrics. Data collection commenced on April 1, 2026, and continued until May 20, 2026.

3.3 Experimental Conditions and Procedure

Participants first received general information about the study, including its stated purpose, procedure, expected duration, compensation, voluntary nature of participation, confidentiality, and data protection in accordance with applicable regulations. To reduce social desirability bias and avoid demand effects, the study was framed as an investigation of how the composition and wording of short job postings influence employer attractiveness. Participants then provided informed consent to participate and to the anonymous processing of their data.

Subsequently, as illustrated in Fig. 2, the first part of the questionnaire collected demographic information, including gender, age, highest educational attainment, current employment status, years of professional experience, and country of residence. Participants who indicated that they were retired were excluded to ensure that the sample reflects individuals who are actively participating in the labor market.

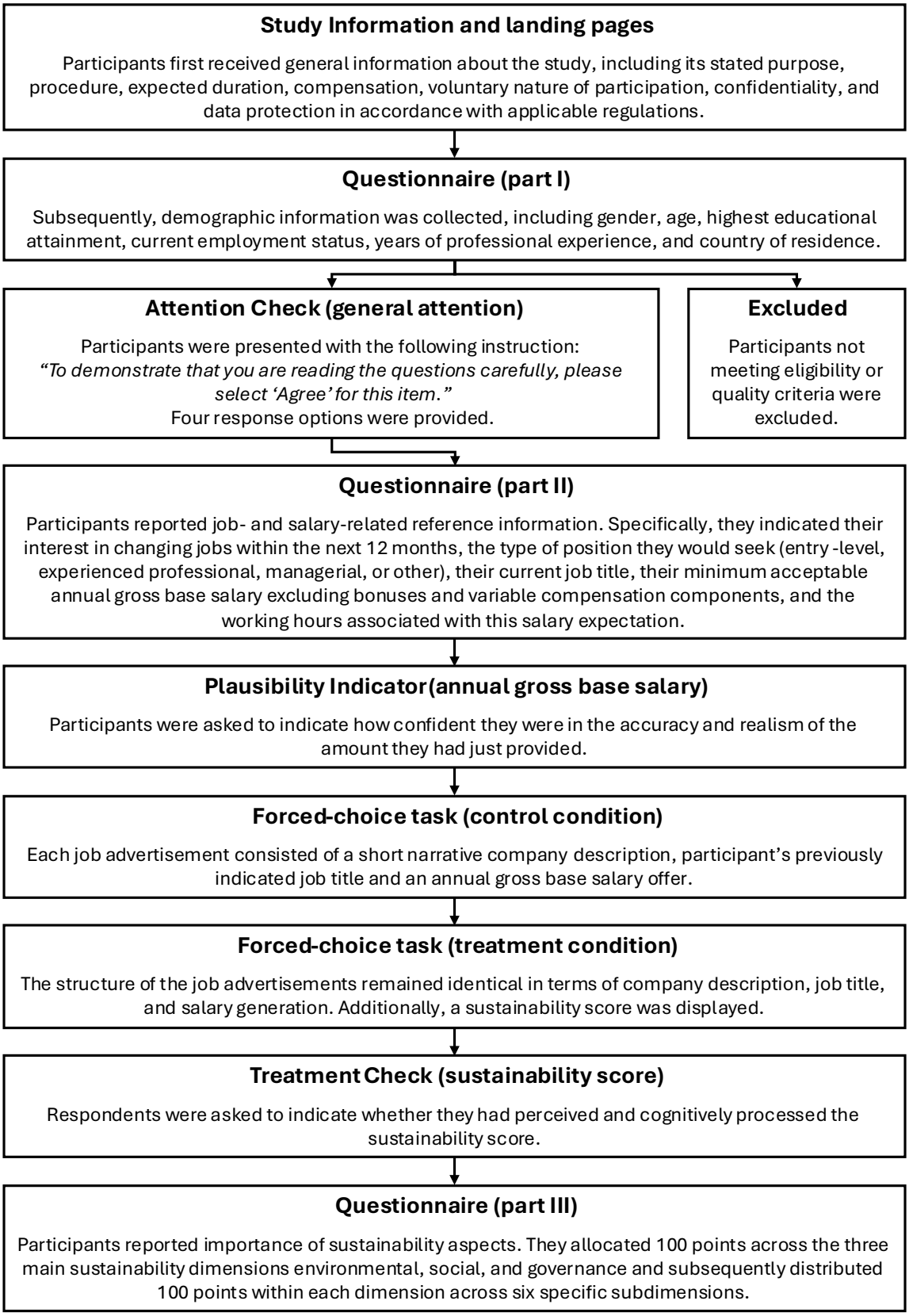


Fig. 2. Survey procedure.

Following the demographic questions, an attention check was administered. Participants were presented with the instruction: “To demonstrate that you are reading the questions carefully, please select ‘Agree’ for this item.” Four response options were provided. This attention check was implemented to identify and exclude inattentive respondents, thereby enhancing the quality and reliability of the collected data. Ensuring that participants carefully read and understood the questions helps to reduce noise and potential bias in the experimental results.

In the second part of the questionnaire, participants provided job- and salary-related reference information. Specifically, they reported their interest in changing jobs within the next 12 months, the type of position they would seek (entry-level, experienced professional, managerial, or other), their current job title, their minimum acceptable annual gross base salary excluding bonuses and other variable compensation components, and the working hours associated with this salary expectation. Participants were required to enter a minimum annual salary of €10,000, while no upper entry limit was imposed. These responses served as individualized reference values for generating the salary offers presented in the subsequent forced-choice tasks.

Following the salary question, participants rated how confident they were that the amount they had reported was accurate and realistic. This salary-confidence item was used as a descriptive plausibility indicator rather than as an objective validation or attention check. Participants were not excluded solely on the basis of their response to this item.

The experimental section consisted of two sequential parts. First, all participants completed the control condition forced-choice task, followed by the treatment condition forced-choice task. A forced-choice format was used because employer selection inherently requires applicants to make trade-offs between competing job alternatives rather than evaluate organizational characteristics in isolation. Repeated choice tasks are widely used in conjoint and discrete-choice research to elicit stated preferences and to estimate how specific job and organizational attributes influence choices while holding other characteristics constant (Hainmueller et al., 2014; Non et al., 2022). By requiring participants to select one of two employer alternatives, the design provided a behaviourally more consequential measure of relative employer preference than independent attractiveness ratings alone. A within-subject design was employed so that each participant completed both experimental conditions and thereby served as their own control. This design reduces unexplained variance arising from

stable individual differences and permits the treatment effect to be estimated from within-person changes in employer choice and accepted relative wage concessions (Charness et al., 2012). The control condition was administered first because exposure to numerical sustainability scores could have sensitized participants to sustainability considerations and thereby contaminated subsequent choices in a score-free condition. Presenting the untreated choice tasks before introducing the scores therefore preserved an uncontaminated baseline against which responses after score disclosure could be compared. The fixed ordering nevertheless entails a potential methodological trade-off. Because condition sequence was not counterbalanced, the estimated treatment effect cannot be fully separated from possible practice, sensitization, and carryover effects (Greenwald, 1976). This limitation was considered preferable to the alternative risk that prior exposure to sustainability scores would alter the conceptual frame participants applied to the control tasks.

As illustrated in Fig. 3, each condition included three forced-choice tasks, which were presented in a randomized order to minimize order effects. The sequence of employer evaluations remained fixed across participants, with control scenarios preceding treatment scenarios. Randomization of task order and employer presentation positions was implemented to reduce potential sequence-related biases.

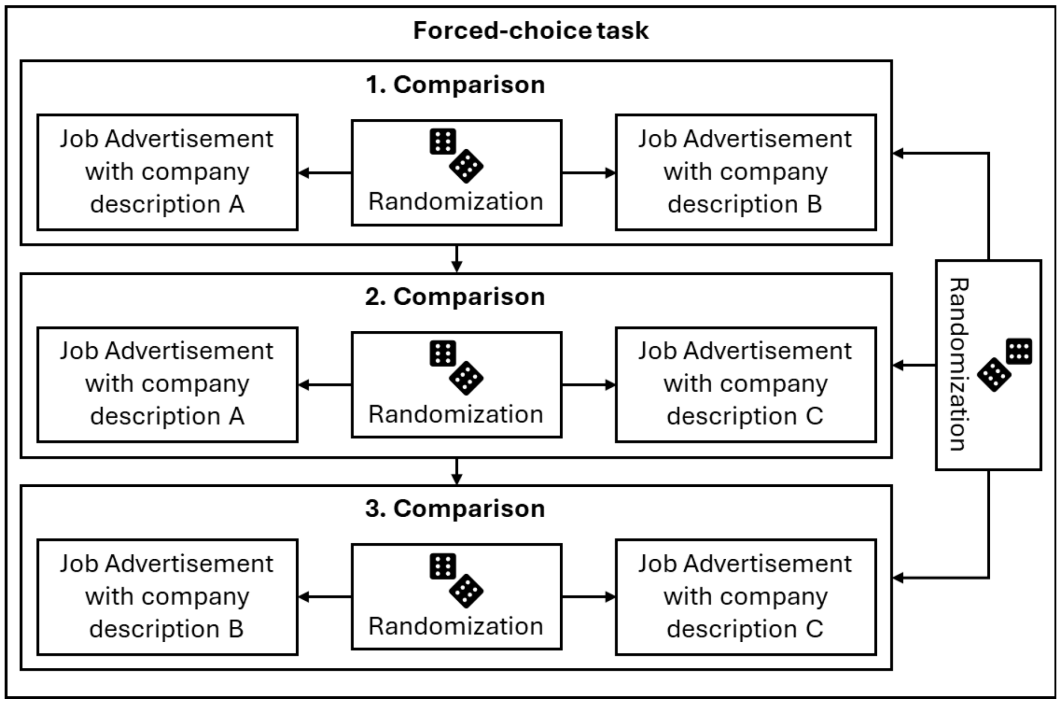


Fig. 3. Structure and randomization of the three pairwise employer-comparison tasks.

In each task, participants were simultaneously presented with two job postings and were required to select one of the two. The positioning of the advertisements (first or second) was randomized across tasks to control for potential positional bias. Each job posting included a brief narrative company description, comprising company size, years of market presence, customer base, and general management orientation. Each element was described in a single sentence to ensure comparability across profiles while maintaining realism. For the experiment, three distinct company profiles were designed (A, B, and C), which are illustrated within Appendix A. They together generated three pairwise comparisons within the job postings: A & B, A & C, and B & C. Below the company description, participants were shown their previously indicated job title along with an annual gross base salary offer. The critical difference between conditions was that, in the treatment condition, each job posting additionally displayed a sustainability score below the salary, accompanied by a brief explanation of the score.

For each pair of job postings, salary levels were generated algorithmically relative to each participant's stated minimum salary expectation. One offer was randomly set between 0.00% and 20.00% above the participant's minimum salary, while the alternative offer was also within the 0.00% to 20.00% range but strictly lower. Thus, both offers exceeded the participant's reservation wage, yet one was always financially superior. The assignment of

which job posting received the higher or lower salary was randomized across tasks to control for potential positional biases.

Following the treatment condition, an treatment check was administered to ensure that participants had noticed and cognitively processed the sustainability information presented in the job postings. Respondents were asked to indicate whether they had perceived and considered the sustainability score when making their choices. This check served to confirm engagement with the treatment and to enhance the internal validity of the experimental results by identifying participants who may have ignored the sustainability information. Following the experimental section, participants completed the third section of the questionnaire, which elicited individual sustainability preferences. Participants allocated 100 points across environmental, social, and governance sustainability dimensions to indicate the relative importance assigned to each sustainability domain.

Subsequently, participants distributed points across underlying ESG sub-criteria to identify more specific sustainability priorities within environmental, social, and governance dimensions. Environmental dimensions included climate change, adaptation measures, water management, circular economy practices, pollution prevention, and biodiversity protection. Social dimensions comprised work conditions, diversity and inclusion, health and safety, human rights, training and development opportunities, and local community engagement. Governance dimensions covered board independence, executive compensation practices, anti-corruption measures, transparency, risk management, and compliance mechanisms. This procedure enabled identification of both higher-level ESG preferences and more specific sustainability priorities, thereby providing the basis for examining ESG preference moderation effects (Hypothesis 3) and ESG prioritization patterns (Research Question 4).

At the conclusion of the survey, all participants received a debriefing, which provided detailed information about the study's purpose, the experimental manipulations, and the use of sustainability scores in the job postings. The debriefing ensured transparency, clarified any potential misconceptions, and reinforced ethical standards by informing participants about the nature of the trade-offs they had encountered during the experiment.

3.4 Data Analysis

A pre-analysis plan specifying the primary outcomes and statistical procedures was registered in advance in the AEA RCT Registry on March 10, 2026 and made publicly available on March 12, 2026 (Trial ID: AEARCTR-0018071).

The experimental design generated repeated employer choice observations because each participant completed multiple forced-choice employer evaluations across randomized job posting scenarios. Observations were therefore nested within participants, requiring analytical approaches that account for within-participant dependence. Mixed-effects regression models were estimated for the main inferential analyses, with random intercepts at the participant level. Employer choice was operationalized as a binary indicator (*choice_high*), where 1 indicated selection of the higher-paying employer alternative and 0 indicated selection of the lower-paying alternative. Accepted relative wage concession (*paycut_pct*) was used as the dependent variable in wage concession models. All variable definitions are provided in Appendix B.

Adjusted regression models were estimated using observations with complete information on all included covariates. Under the binary gender coding used in the regression analyses, eight participants who selected a non-binary gender identity or did not disclose their gender were not included in the adjusted estimation sample. The adjusted models therefore comprised 2,773 participants and 16,638 task-level observations. Analyses restricted to the treatment condition used the three treatment observations of each included participant, resulting in 8,319 observations.

Hypothesis 1 examined whether the mere presence of sustainability scores affected employer choice and accepted wage concessions. First, descriptive employer choice frequencies were compared across control and treatment conditions. Second, an unadjusted Pearson X^2 test was used to assess whether employer choice distributions differed between conditions. Because participants completed repeated employer evaluations, this test was interpreted only as descriptive evidence of association. The main inferential test relied on mixed-effects linear regression. The dependent variable was accepted relative wage concession *(paycut_pct*), calculated as the salary difference between the higher-paying and lower-paying alternatives divided by participants' stated salary expectations when the lower-paying alternative was selected, and set to zero when the higher-paying alternative was

selected. The key independent variable was sustainability score presence (treatment), coded 0 for control tasks without sustainability information and 1 for treatment tasks including sustainability scores. Salary difference, age, gender, salary expectation, and professional experience were included as control variables. Additional heterogeneity analyses used interaction terms between treatment exposure and applicant attributes, including gender, education, employment status, professional experience, application intention, and career level. Average marginal effects were estimated to examine the treatment effect within the corresponding subgroups. These analyses were interpreted as exploratory because subgroup-specific marginal effects do not, by themselves, establish statistically significant differences between groups.

Hypothesis 2 examined whether accepted wage concessions increased with the magnitude of the sustainability score difference between competing employer alternatives. The analysis was restricted to treatment observations because sustainability score differences are only observable and theoretically meaningful when sustainability scores are displayed. The dependent variable was accepted relative wage concession (*paycut_pct*), and the key independent variable was sustainability score difference (*score_diff*). The independent variable was calculated as the difference between the higher and lower sustainability scores presented for the two employer alternatives (*score_high* − *score_low*). The resulting non-negative measure captures the magnitude of the sustainability score gap between the employers, with a value of zero indicating identical scores and larger values indicating a greater relative sustainability advantage of the higher-rated employer. The model additionally controlled for the absolute sustainability score of the higher-rated employer (*score_high*) to isolate the effect of relative score differences from the effect of high sustainability scores in general. Standardized age (*age_z*), gender, salary expectations, and professional experience were included as further control variables. Predicted values were calculated using post-estimation margins to visualize how accepted relative wage concessions changed across increasing sustainability score differences. Additional heterogeneity analyses used interaction terms between *score_diff* and applicant attributes, including gender, standardized age, education, employment status, professional experience, career level, and application intention. Average marginal effects of *score_diff* were calculated for each subgroup and interpreted as exploratory evidence of attribute-specific responsiveness.

Hypothesis 3 tested whether applicants' ESG preferences moderated the effects of sustainability scores on employer choice and accepted relative wage concessions. ESG preferences were measured using participants' constant-sum allocations to environmental, social, and governance dimensions. Three moderator variables were used: environmental preference (*esg_environment*), social preference (*esg_social*), and governance preference (*esg_governance*). First, mixed-effects logistic regression models tested whether ESG preferences moderated the effect of sustainability score presence on employer choice. The dependent variable was selection of the higher-paying employer alternative (*choice_high*), and the key interaction terms were treatment exposure × ESG preference dimension. Second, mixed-effects linear regression models restricted to treatment observations tested whether ESG preferences moderated the effect of sustainability score differences on accepted relative wage concessions. The dependent variable was accepted relative wage concession (*paycut_pct*), and the key interaction terms were sustainability score difference × ESG preference dimension.

To address Research Question 4, descriptive analyses and non-parametric tests were used to examine applicants' prioritization of ESG dimensions and sub-criteria. Mean importance scores were calculated for environmental, social, and governance dimensions as well as for their underlying sub-components. Pairwise Wilcoxon signed-rank tests were conducted to compare within-participant importance allocations across the three ESG dimensions. These analyses identified relative sustainability priorities and provided statistical evidence for differences in ESG dimension rankings.

4. Results

4.1 Sample Description and Manipulation Checks

The full analytical sample comprised 2,781 participants after applying the predefined participant-level exclusion criteria. A total of 8,044 individuals initiated the survey. Participants who did not complete the survey, failed the attention check, reported ineligible employment situations, or resided outside Germany were excluded. Because each retained participant completed six forced-choice employer evaluations, the full long-format dataset contained 16,686 employer choice observations. The adjusted regression analyses used 2,773 participants and 16,638 task-level observations. Eight participants were not included in these models because they selected a non-binary gender identity. Treatment-only regression models used three observations per included participant and therefore comprised 8,319 observations.

The sample exhibited substantial demographic heterogeneity. Female participants represented 54.98% of the sample, while 44.73% identified as male. 0.29% selected either non-binary gender identities or no disclosure. Educational backgrounds covered multiple qualification levels, with the largest categories including secondary education (28.34%), upper secondary education (27.69%), master's degrees or equivalent qualifications (14.02%), and bachelor's degrees (13.59%). Participants additionally represented diverse professional experience levels, supporting investigation across diverse labor market profiles.

Because each participant completed both control and treatment tasks, conventional between-group randomization balance checks were not applicable. Participant-level characteristics such as age, gender, education, salary expectations, and professional experience were identical across conditions by design. Internal validity therefore did not depend on demographic balance between separate experimental groups, but on the randomized assignment of task characteristics within the repeated forced-choice structure, including employer presentation order, salary differences, company profiles, and sustainability score differences. Because each participant completed both control and treatment tasks, conventional between-group randomization balance checks were not applicable. Participant-level characteristics such as age, gender, education, salary expectations, and professional experience were identical across conditions by design. Internal validity therefore did not depend on demographic balance between separate experimental groups but on the

randomized assignment of task characteristics within the repeated forced-choice structure, including employer presentation positions, salary differences, company profiles, and sustainability score differences. Treatment engagement and data quality were assessed using manipulation checks. The dependence arising from repeated observations within participants was addressed analytically using mixed-effects models with participant-specific random intercepts.

As an additional descriptive check of participant-level choice variation, the number of higher-paying employer choices was aggregated across the six forced-choice tasks for each participant. This analysis examined whether participants systematically selected the same type of employer alternative across all tasks or whether they varied their choices across decision scenarios. The results showed substantial variation in choice behaviour. Only 4.21% of participants never selected the higher-paying employer, whereas 16.40% selected the higher-paying employer in all six tasks. Most participants therefore alternated between higher- and lower-paying employer alternatives across the experiment. This pattern indicates that the choice data were not dominated by a small group of consistently salary-maximizing or consistently salary-discounting participants but reflected meaningful variation in employer choice behaviour.

The treatment manipulation was successfully noticed by 81.27% of participants, indicating substantial awareness of the sustainability score. In addition, an attention check was used to exclude inattentive respondents, a plausibility indicator was implemented to improve the validity of individually stated salary benchmarks, and mixed-effects models accounted for repeated observations nested within participants.

4.2 Test of Hypothesis 1: Effect of Sustainability Scores on Relative Wage Acceptance and Employer Choice

Hypothesis 1 predicted that the presence of sustainability scores in job postings would increase applicants' willingness to accept lower relative wages compared with otherwise comparable job postings without sustainability information. Importantly, this hypothesis focuses on the availability of sustainability score information, independent of the specific magnitude of the score. The analysis therefore examined whether the mere presence of a sustainability score affected employer choice decisions and accepted wage concessions.

The analysis proceeded in three steps. First, descriptive employer choice patterns were examined to assess whether sustainability information was associated with a shift in choices between higher-paying and lower-paying employer alternatives. Second, an unadjusted Pearson X^2 test was conducted to test whether employer choice distributions differed between control and treatment conditions. Third, the main test of Hypothesis 1 was conducted using mixed-effects linear regression with accepted relative wage concessions as the dependent variable. This model accounted for the repeated-observation structure of the experimental design.

Descriptive comparisons provided initial evidence consistent with Hypothesis 1. Table 1 presents employer choice distributions across experimental conditions. Under control conditions without sustainability information, participants selected the higher-paying employer alternative in 62.51% of decisions. In contrast, when sustainability information was available, selection of the higher-paying employer alternative decreased to 53.41%. Correspondingly, the proportion of choices favouring the lower-paying employer alternative increased from 37.49% in the control condition to 46.59% in the treatment condition. These descriptive patterns suggest that sustainability information shifted employer choice decisions away from the financially superior employer alternative.

Table 1

Employer Choice Decisions Across Experimental Conditions.

Condition	Lower Salary Chosen	Higher Salary Chosen	N
Control	37.49%	62.51%	8,343
Treatment	46.59%	53.41%	8,343
Total	42.04%	57.96%	16,686

Notes: Control condition contained employer alternatives without sustainability information. Treatment condition contained employer alternatives including sustainability scores.

An unadjusted Pearson chi-square test indicated that employer-choice distributions differed between conditions, X^2 (1) = 141.69, $p < .001$. This result provides descriptive evidence that the availability of sustainability scores was associated with a significant shift in employer choice away from the higher-paying alternative. However, because the X^2 test does not account for the repeated-observation structure of the experimental design, this test is

interpreted as an unadjusted association test rather than as the main inferential test of Hypothesis 1.

The main test of Hypothesis 1 relied on mixed-effects linear regression. In this model, accepted relative wage concession (*paycut_pct*) served as the dependent variable, while sustainability score presence (treatment) was the key independent variable. Salary difference, age, gender, salary expectations, and professional experience were included as control variables. Accepted relative wage concessions were operationalized as the percentage salary concession accepted relative to participants individually stated salary expectations. Participants who selected the higher-paying employer alternative were assigned a wage concession value of zero, whereas participants who selected the lower-paying employer alternative were assigned a positive wage concession value reflecting the salary difference between the higher-paying and lower-paying alternatives relative to their stated salary expectation. Random intercepts were estimated to account for repeated employer evaluations within participants. The model was specified as follows:

$$Paycut_{ij} = \beta_0 + \beta_1 Treatment_{ij} + \gamma' X_{ij} + u_i + \varepsilon_{ij} \quad (1)$$

where i denotes participants and j denotes employer choice tasks. $Paycut_{ij}$ represents the accepted relative wage concession of participant i in task j, $Treatment_{ij}$ indicates whether sustainability scores were displayed, and X_{ij} denotes the vector of control variables, including salary difference, age, gender, salary expectations, and professional experience. The participant-specific random intercept u_i captures unobserved heterogeneity across participants, while ε_{ij} denotes the observation-level error term. The coefficient β_1 captures the conditional effect of sustainability score presence on accepted relative wage concessions.

As shown in Table 3, the regression results supported Hypothesis 1. Accepted relative wage concessions were 0.398 percentage points higher in the score-disclosure condition than in the preceding score-free condition, controlling for the included covariates b = 0.398, SE = 0.050, p < .001, 95% CI [0.300, 0.495]. In substantive terms, participants accepted wage concessions that were approximately 0.41 percentage points higher when sustainability scores were displayed than when otherwise comparable employer alternatives did not contain sustainability information. The descriptive statistics reported in Table 2 show that the mean accepted relative wage concession increased from 1.77% in the control condition

to 2.18% in the treatment condition, corresponding to an unadjusted difference of approximately 0.41 percentage points.

Table 2

Adjusted Difference in Accepted Relative Wage Concessions Between Score-Free and Score-Disclosure Tasks.

Experimental condition	Mean accepted relative wage concession (%)
Control condition	1.77
Treatment condition	2.18
Unadjusted difference	0.41

Notes: Table 2 reports unadjusted mean accepted relative wage concessions by experimental condition. Accepted relative wage concession was measured as the salary difference between the higher-paying and lower-paying employer alternatives relative to participants' individually stated salary expectations. The variable was set to zero when the higher-paying employer was selected and assumed a positive value when the lower-paying employer was selected. The descriptive statistics are based on the full sample of 16,686 task-level observations from 2,781 participants.

Table 3

Effect of Sustainability Score Presence on Accepted Relative Wage Concessions.

Predictor	Coefficient	SE	p-value	95% CI
Sustainability score present	0.398***	0.050	< .001	[0.300, 0.495]

Notes: This table reports estimates from a mixed-effects linear regression examining the effect of sustainability score presence on accepted relative wage concessions. The dependent variable, accepted relative wage concession (paycut_pct), was calculated as the difference between the higher-paying and lower-paying employer alternatives divided by the participant's individually stated minimum salary expectation when the lower-paying alternative was selected, and was set to zero when the higher-paying alternative was selected. The treatment variable equals 1 when sustainability scores were displayed and 0 otherwise. The model controls for the salary difference between the two employer alternatives, age, gender, stated salary expectation, and professional experience, and includes random intercepts at the participant level to account for repeated observations. The reported treatment coefficient represents the adjusted percentage-point difference in

*accepted relative wage concessions between treatment and control tasks. SE denotes standard error; CI denotes confidence interval. ***p < .001.*

To further explore whether the effect of sustainability score presence differed across applicant attributes, additional mixed-effects interaction models were estimated. Table 4 reports the resulting attribute-specific average marginal effects. Overall, the treatment effect was positive across most applicant groups, suggesting that the presence of sustainability scores increased accepted relative wage concessions for a broad range of participants. The strongest estimated effects were observed among master's students (b = 0.993), participants with less than one year of professional experience (b = 0.811), bachelor students (b = 0.736), participants without professional experience (b = 0.605), and career entrants (b = 0.572). Female participants also showed a stronger treatment effect (b = 0.492) than male participants (b = 0.282). By contrast, smaller or statistically non-significant effects were observed among participants with doctoral or habilitation-level qualifications, participants without a school certificate, school students, and managers. These subgroup patterns suggest that sustainability score presence was particularly influential among applicants at earlier or more transitional stages of their labor market careers. However, these results should be interpreted as exploratory heterogeneity evidence, because subgroup-specific treatment effects indicate within-group responsiveness, whereas statistically significant interaction terms are required to confirm whether effects differ significantly between groups.

Table 4

Attribute-specific marginal effects of Sustainability Score Presence on Accepted Relative Wage Concessions.

Applicant attribute	Group	Treatment effect	SE	p-value	95% CI
Gender	Male	0.282***	0.074	< .001	[0.136, 0.427]
Gender	Female	0.492***	0.067	< .001	[0.361, 0.623]
Education	High school diploma	0.511***	0.094	< .001	[0.326, 0.696]
Education	Bachelor's degree	0.461***	0.135	< .001	[0.197, 0.725]
Education	Habilitation	-0.469	1.308	.720	[-3.033, 2.095]
Education	Lower secondary school certificate	0.324	0.181	.074	[-0.031, 0.680]
Education	No school certificate	-0.658	0.827	.426	[-2.280, 0.963]
Education	Master's degree / diploma	0.446***	0.132	< .001	[0.187, 0.706]
Education	Master craftsman qualification	0.212	0.253	.402	[-0.284, 0.708]
Education	Doctorate	-0.079	0.463	.864	[-0.986, 0.827]
Education	Intermediate secondary school certificate	0.304**	0.093	.001	[0.121, 0.487]
Education	State examination	0.486	0.274	.077	[-0.052, 1.023]
Employment status	Job-seeking	0.533*	0.242	.028	[0.059, 1.007]
Employment status	Vocational training	0.485	0.298	.104	[-0.099, 1.070]
Employment status	School student	-0.087	0.478	.856	[-1.023, 0.849]
Employment status	Bachelor student	0.736***	0.196	< .001	[0.353, 1.119]

Applicant attribute	Group	Treatment effect	SE	p-value	95% CI
Employment status	Master student	0.993**	0.317	.002	[0.372, 1.615]
Employment status	Part-time employed	0.403***	0.110	< .001	[0.188, 0.618]
Employment status	Full-time employed	0.333***	0.063	< .001	[0.210, 0.456]
Professional experience	1–3 years	0.418**	0.141	.003	[0.142, 0.695]
Professional experience	4–6 years	0.421**	0.140	.003	[0.145, 0.696]
Professional experience	7–10 years	0.263	0.147	.074	[-0.025, 0.552]
Professional experience	No experience	0.605**	0.189	.001	[0.235, 0.975]
Professional experience	More than 10 years	0.349***	0.069	< .001	[0.214, 0.484]
Professional experience	Less than 1 year	0.811***	0.223	< .001	[0.375, 1.248]
Career level	Career entrant	0.572***	0.114	< .001	[0.348, 0.795]
Career level	Experienced professional	0.389***	0.066	< .001	[0.259, 0.518]
Career level	Managerial position	0.283**	0.100	.005	[0.086, 0.480]
Application intent	Rather likely to apply for a new job	0.409***	0.100	< .001	[0.214, 0.605]
Application intent	Rather unlikely to apply for a new job	0.328***	0.092	< .001	[0.148, 0.507]
Application intent	Definitely likely to apply for a new job	0.408**	0.127	.001	[0.159, 0.657]

Applicant attribute	Group	Treatment effect	SE	p-value	95% CI
Application intent	Definitely unlikely to apply for a new job	0.450***	0.090	< .001	[0.274, 0.627]

*Notes: The table reports attribute-specific average marginal effects of sustainability score presence derived from separate mixed-effects linear regression models. The dependent variable is accepted relative wage concession (paycut_pct), and the treatment variable indicates whether sustainability scores were displayed. The models controlled for salary difference, age, gender, salary expectations, and professional experience, where applicable, and included random intercepts at the participant level. The reported coefficients indicate the estimated percentage-point difference in accepted relative wage concessions between treatment and control tasks within each subgroup. Significance levels indicate whether each subgroup-specific marginal effect differs from zero and do not establish statistically significant differences between subgroups; such differences require significance of the corresponding interaction terms. The estimation sample comprised 16,638 observations from 2,773 participants. *p < .05, **p < .01, ***p < .001.*

Taken together, the results provide qualified support for Hypothesis 1. Accepted relative wage concessions were higher, and higher-paying employer alternatives were selected less frequently, in the score-disclosure condition than in the preceding score-free condition. These patterns are consistent with the interpretation that sustainability information was associated with changes in relative employer preferences and applicants' willingness to trade off compensation. However, because the score-disclosure condition always followed the score-free condition, the observed differences cannot be attributed exclusively to sustainability score presence and may also reflect practice, fatigue, sensitization, or other order-related effects. Moreover, the forced-choice outcome captures relative employer preference rather than employer attractiveness directly.

4.3 Test of Hypothesis 2: Effect of Sustainability Score Magnitude on Wage Concessions

Hypothesis 2 predicted that applicants' willingness to accept lower relative wages would increase with the magnitude of the sustainability score difference between competing employer alternatives. In contrast to Hypothesis 1, which examined the mere presence of

sustainability scores, Hypothesis 2 focuses on whether larger differences in sustainability scores between employers affect accepted wage concessions. Accordingly, the analysis was restricted to treatment observations, because sustainability score differences are only observable and theoretically meaningful when sustainability scores are displayed.

The main test of Hypothesis 2 relied on a mixed-effects linear regression model restricted to treatment observations. Accepted relative wage concession (*paycut_pct*) served as the dependent variable, while sustainability score difference (*score_diff*) was the key independent variable. The model additionally controlled for the absolute sustainability score of the higher-rated employer (*score_high*), standardized age, gender, salary expectations, and professional experience. The model was specified as follows:

$$Paycut_{ij} = \beta_0 + \beta_1 ScoreDiff_{ij} + \beta_2 ScoreHigh_{ij} + \gamma' X_i + u_i + \varepsilon_{ij} \quad (2)$$

where i denotes participants and j denotes employer choice tasks. $ScoreDiff_{ij}$ represents the sustainability score difference between the two employer alternatives in task j, and $ScoreHigh_{ij}$ denotes the sustainability score of the higher-rated employer. The vector X_i contains the participant-level control variables, including standardized age, gender, salary expectations, and professional experience. The participant-specific random intercept u_i captures unobserved heterogeneity across participants, while ε_{ij} denotes the observation-level error term. The coefficient β_1 captures the conditional change in accepted relative wage concessions associated with a one-point increase in the sustainability score difference, whereas β_2 captures the conditional effect of the absolute sustainability score of the higher-rated employer.

As shown in Table 5, sustainability score difference had a positive and statistically significant effect on accepted relative wage concessions, b = 0.012, SE = 0.002, p < .001, 95% CI [0.007, 0.016], thereby supporting Hypothesis 2. This indicates that larger sustainability score differences between employer alternatives increased applicants' willingness to accept lower relative wages. In substantive terms, a one-point increase in sustainability score difference was associated with an increase of approximately 0.012 percentage points in accepted relative wage concessions. Under the linear model specification, score differences of 10 and 40 points correspond to estimated increases of approximately 0.12 and 0.47 percentage points, respectively. The effect remained significant after controlling for the absolute sustainability score of the higher-rated employer,

standardized age, gender, salary expectations, and professional experience. Because the analysis was restricted to the three treatment observations contributed by each of the 2,773 participants in the adjusted estimation sample, the model was estimated using 8,319 task-level observations.

Table 5

Effect of Sustainability Score Difference on Accepted Relative Wage Concessions.

Predictor	Coefficient	SE	p-value	95% CI
Sustainability score difference	0.012***	0.002	< .001	[0.007, 0.016]

*Notes: The dependent variable is accepted relative wage concession (paycut_pct). The coefficient is derived from a mixed-effects linear regression restricted to treatment observations and controlling for the sustainability score of the higher-rated employer, standardized age, gender, salary expectations, and professional experience, with random intercepts at the participant level. The estimation sample comprised 16,638 task-level observations from 2,773 participants. Eight participants were not included because the regression model used a binary gender covariate and these participants selected a non-binary gender identity or did not disclose their gender. ***p < .001.*

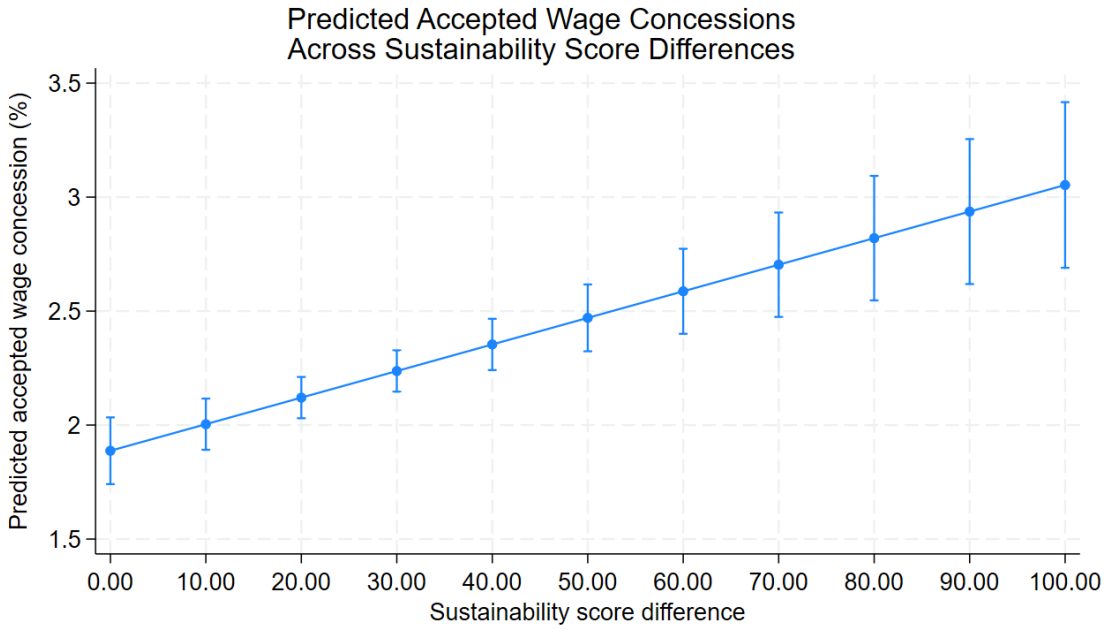


Fig. 4. Predicted Wage Concessions Across Sustainability Score Differences.

Notes: Predicted values are based on a mixed-effects linear regression restricted to treatment observations. The dependent variable is accepted relative wage concession. The model controls for the absolute sustainability score of the higher-rated employer, standardized age, gender, salary expectations, and professional experience. Error bars indicate 95% confidence intervals.

Fig. 4 visualizes the predicted accepted relative wage concessions across increasing sustainability score differences. The vertical axis represents the predicted total accepted wage concession as a percentage of participants' stated salary expectations. Thus, the graph does not show only the isolated incremental effect of *score_diff*; rather, it shows the model-predicted overall level of accepted wage concessions at different score-difference values. This explains why the predicted wage concession is already above zero when the sustainability score difference is zero. Even without a score difference, the model predicts a baseline wage concession because other factors, including the absolute sustainability score level, demographic characteristics, salary expectations, and professional experience, also contribute to wage concession decisions.

As shown in Fig. 4, predicted accepted wage concessions increase steadily as sustainability score differences become larger. This pattern is consistent with Hypothesis 2 and indicates that applicants respond not only to the availability of sustainability information, but also to the relative sustainability advantage of one employer over another. However, the slope of the line also illustrates that the magnitude effect is modest. While score differences significantly influenced wage concessions, the incremental increase per additional score point was small. Larger score gaps are therefore required for the effect to become substantively visible.

Additional mixed-effects interaction models explored whether the association between sustainability score differences and accepted relative wage concessions varied across applicant attributes. The estimated score-difference effect was positive for many subgroups, although its magnitude and statistical significance varied across groups. Table 6 reports subgroup-specific average marginal effects, which indicate whether the estimated effect differs from zero within each subgroup. Because the table does not report formal between-group contrasts, differences in coefficient magnitude or statistical significance across subgroups should not be interpreted as evidence that the effects differ significantly between groups. The subgroup results are therefore interpreted as descriptive and exploratory.

Table 6

Attribute-Specific Effects of Sustainability Score Difference on Accepted Relative Wage Concessions.

Applicant attribute	Group	Score-difference effect	SE	p-value	95% CI
Gender	Male	0.009**	0.003	.006	[0.002, 0.015]
Gender	Female	0.014***	0.003	< .001	[0.009, 0.020]
Age	Younger applicants, −1 SD	0.013***	0.003	< .001	[0.007, 0.019]
Age	Average age	0.012***	0.002	< .001	[0.007, 0.016]
Age	Older applicants, +1 SD	0.010***	0.003	< .001	[0.004, 0.016]
Education	High school diploma	0.015***	0.004	< .001	[0.008, 0.023]
Education	Bachelor’s degree	0.012*	0.005	.018	[0.002, 0.023]
Education	Habilitation	0.007	0.056	.904	[-0.103, 0.117]
Education	Lower secondary school certificate	0.016*	0.007	.014	[0.003, 0.029]
Education	No school certificate	0.007	0.032	.833	[-0.056, 0.069]
Education	Master’s degree / diploma	0.009	0.005	.080	[-0.001, 0.018]
Education	Master craftsman qualification	0.028**	0.010	.003	[0.010, 0.047]
Education	Doctorate	0.022	0.017	.191	[-0.011, 0.056]
Education	Intermediate secondary school certificate	0.008*	0.004	.043	[0.000, 0.015]
Education	State examination	-0.005	0.010	.591	[-0.025, 0.014]
Employment status	Job-seeking	0.026**	0.009	.006	[0.008, 0.044]

Applicant attribute	Group	Score-difference effect	SE	p-value	95% CI
Employment status	Vocational training	0.003	0.011	.763	[-0.018, 0.024]
Employment status	School student	0.024	0.017	.154	[-0.009, 0.058]
Employment status	Bachelor student	0.029***	0.008	< .001	[0.014, 0.045]
Employment status	Master student	0.025*	0.011	.024	[0.003, 0.047]
Employment status	Part-time employed	0.018***	0.004	< .001	[0.010, 0.026]
Employment status	Full-time employed	0.007*	0.003	.012	[0.002, 0.012]
Professional experience	1–3 years	0.013*	0.006	.019	[0.002, 0.024]
Professional experience	4–6 years	0.008	0.005	.149	[-0.003, 0.018]
Professional experience	7–10 years	0.007	0.005	.190	[-0.003, 0.018]
Professional experience	No experience	0.015*	0.007	.037	[0.001, 0.029]
Professional experience	More than 10 years	0.012***	0.003	< .001	[0.006, 0.018]
Professional experience	Less than 1 year	0.019*	0.008	.024	[0.003, 0.036]
Career level	Career entrant	0.020***	0.004	< .001	[0.012, 0.029]
Career level	Experienced professional	0.009**	0.003	.003	[0.003, 0.014]

Applicant attribute	Group	Score-difference effect	SE	p-value	95% CI
Career level	Managerial position	0.012**	0.004	.003	[0.004, 0.020]
Application intent	Rather likely to apply for a new job	0.014***	0.004	< .001	[0.007, 0.022]
Application intent	Rather unlikely to apply for a new job	0.008*	0.004	.027	[0.001, 0.015]
Application intent	Definitely likely to apply for a new job	0.022***	0.005	< .001	[0.013, 0.032]
Application intent	Definitely unlikely to apply for a new job	0.008*	0.004	.036	[0.001, 0.015]

*Notes: This table reports subgroup-specific average marginal effects of sustainability score difference derived from separate mixed-effects linear regression models restricted to treatment observations. The dependent variable is accepted relative wage concession (paycut_pct). The models controlled for the sustainability score of the higher-rated employer, standardized age, gender, salary expectations, and professional experience, where applicable, and included random intercepts at the participant level. The reported coefficients indicate the estimated percentage-point change in accepted relative wage concessions associated with a one-point increase in sustainability score difference within each subgroup. Significance levels test whether the subgroup-specific marginal effect differs from zero; they do not test whether marginal effects differ significantly between subgroups. Differences in coefficient magnitude or statistical significance across groups should therefore not be interpreted as evidence of statistically significant between-group differences. The subgroup analyses are descriptive and exploratory. *p < .05, **p < .01, ***p < .001.*

The findings support Hypothesis 2 by showing that the magnitude of the sustainability score difference contributed additional explanatory value beyond the mere presence of sustainability information. Whereas Hypothesis 1 captures the discrete effect of displaying sustainability scores, Hypothesis 2 demonstrates that applicants also responded to the size

of the relative sustainability advantage. Because the two coefficients represent differently scaled predictors, their magnitudes should not be compared directly.

4.4 Test of Hypothesis 3: Moderating Role of ESG Preferences

Hypothesis 3 predicted that applicants' ESG preferences would moderate the effect of sustainability scores on employer choice and accepted relative wage concessions. Unlike the previous analyses, which examined either the presence of sustainability scores or the magnitude of sustainability score differences, this analysis focused on whether individual sustainability priorities shaped applicants' responsiveness to sustainability information. ESG preferences were measured through participants' constant-sum allocations across environmental, social, and governance dimensions.

The analysis proceeded in two steps. First, mixed-effects logistic regression models were estimated to examine whether ESG preferences moderated the effect of sustainability score presence on employer choice. The dependent variable was selection of the higher-paying employer alternative (*choice_high*). The key interaction terms were treatment exposure interacted with environmental, social, and governance preferences. The employer-choice moderation models were specified as follows:

$$\begin{aligned} logit\big[P\big(ChoiceHigh_{ij} = 1\big)\big] \\ &= \beta_{0d} + \beta_{1d} Treatment_{ij} + \beta_{2d} ESG_{id} \\ &+ \beta_{3d}\big(Treatment_{ij}\ x\ ESG_{id}\big) + \gamma'_d X_{ij} + u_{id} \end{aligned} \quad (3)$$

where. $ChoiceHigh_{ij}$ equals 1 when participant i selected the higher-paying employer alternative in task j, and 0 otherwise. The left-hand side represents the log odds of selecting the higher-paying employer. $Treatment_{ij}$ indicates whether sustainability scores were displayed, while ESG_{id} represents the number of preference points allocated by participant i to ESG dimension d. The coefficient β_{0d} is the model intercept for ESG dimension d. The coefficient β_{1d} captures the effect of displaying sustainability scores when the respective ESG preference equals zero, while β_{2d} captures the association between the respective ESG preference and employer choice in the control condition. The interaction coefficient β_{3d} tests whether the effect of sustainability score presence on employer choice varies with the importance assigned to ESG dimension d. γ'_d represents the corresponding vector of estimated coefficients. The participant-specific random intercept u_{id} accounts for

unobserved heterogeneity across participants and the dependence arising from repeated choices made by the same participant. The reported odds ratios were obtained by exponentiating the estimated logit coefficients.

Second, mixed-effects linear regression models were estimated to examine whether ESG preferences moderated the effect of sustainability score differences on accepted relative wage concessions. These models were restricted to treatment observations and used accepted relative wage concession (*paycut_pct*) as the dependent variable. The key interaction terms were sustainability score difference interacted with environmental, social, and governance preferences. The wage-concession moderation models were specified as follows:

$$\begin{aligned} Paycut_{ij} = & \propto_{0d} + \propto_{1d} ScoreDiff_{ij} + \propto_{2d} ESG_{id} \\ & + \propto_{3d} \left(ScoreDiff_{ij}\ x\ ESG_{id}\right) + \propto_{4d} ScoreHigh_{ij} + \delta'_d Z_i \\ & + u_{id} + \varepsilon_{ij} \end{aligned} \quad (4)$$

where $Paycut_{ij}$ represents the accepted relative wage concession of participant i in task j, expressed as a percentage of the participant's stated salary expectation. The coefficient $\propto_{0d}$ is the intercept for the model estimated for ESG dimension d. The coefficient $\propto_{1d}$ captures the association between sustainability score difference and accepted relative wage concessions when the preference value for the respective ESG dimension equals zero. The coefficient $\propto_{2d}$ captures the association between the respective ESG preference and accepted relative wage concessions when the sustainability score difference equals zero. The interaction coefficient $\propto_{3d}$ tests whether the relationship between sustainability score difference and accepted relative wage concessions varies with the importance assigned to ESG dimension d. The coefficient $\propto_{4d}$ captures the conditional association between the absolute sustainability score of the higher-rated employer and accepted relative wage concessions, holding the score difference and all other covariates constant.

The vector Z_i contains the participant-level control variables, including standardized age, gender, salary expectations, and professional experience, while δ'_d represents the corresponding vector of estimated coefficients. The models were estimated separately for environmental, social, and governance preferences and were restricted to treatment observations because sustainability score differences were observable only when sustainability scores were displayed.

4.4.1 ESG Preferences and Employer Choice

Table 7 reports the results of the mixed-effects logistic regression models predicting selection of the higher-paying employer alternative. Because the dependent variable captures selection of the higher-paying employer, odds ratios below 1 indicate a lower likelihood of choosing the financially superior employer alternative.

Table 7

Moderating Effects of ESG Preferences on Employer Choice Decisions.

Variable	Environmental preference model	Social preference model	Governance preference model
Sustainability score present	0.860*	0.602***	0.439***
	(0.059)	(0.053)	(0.036)
	p = .026	p < .001	p < .001
	[0.752, 0.982]	[0.506, 0.715]	[0.374, 0.515]
ESG preference dimension	0.994**	1.001	1.005*
	(0.002)	(0.002)	(0.002)
	p = .002	p = .713	p = .012
	[0.990, 0.998]	[0.997, 1.005]	[1.001, 1.008]
Treatment × ESG preference dimension	0.988***	1.001	1.010***
	(0.002)	(0.002)	(0.002)
	p < .001	p = .687	p < .001
	[0.984, 0.992]	[0.997, 1.005]	[1.006, 1.013]
Observations	16,638	16,638	16,638
Participants	2,773	2,773	2,773
Participant random intercept	Yes	Yes	Yes
Controls	Yes	Yes	Yes

*Notes: Mixed-effects logistic regression models predicting selection of the higher-paying employer alternative. Reported estimates are odds ratios. Standard errors are shown in parentheses, followed by exact p-values and 95% confidence intervals in brackets. Each model includes a participant-specific random intercept and controls for salary difference, standardized age, gender, salary expectations, and professional experience. The ESG preference variable corresponds to the environmental, social, or governance preference allocation in the respective model. Because the dependent variable equals 1 when the higher-paying employer was selected, odds ratios below 1 indicate a lower likelihood of choosing the higher-paying employer. The principal test of moderation is the interaction between treatment exposure and the respective ESG preference dimension. The coefficient for sustainability score presence represents the treatment effect when the respective ESG preference allocation equals zero. The coefficient for the ESG preference dimension represents its association with employer choice in the control condition. Adjusted models were estimated using 2,773 participants rather than the full sample of 2,781 because [verified reason]. Table 8 is additionally restricted to treatment observations, yielding three observations per participant. *p < .05, **p < .01, ***p < .001.*

The results show that ESG preferences moderated the effect of sustainability score presence on employer choice, but the direction and strength of moderation differed across ESG dimensions. Environmental preferences significantly moderated the treatment effect, OR = 0.988, p < .001. Because the dependent variable captures selection of the higher-paying employer alternative, this odds ratio below 1 indicates that stronger environmental preferences intensified the shift away from the higher-paying employer when sustainability scores were displayed. In other words, environmentally oriented applicants were more responsive to sustainability information in employer choice decisions and became less likely to choose the financially superior alternative when sustainability scores were available.

Social preferences did not significantly moderate the treatment effect, OR = 1.001, p = .687. This suggests that the importance assigned to social sustainability did not systematically change the effect of sustainability score presence on employer choice. Although social sustainability was important in participants' stated ESG allocations, it did not significantly condition the choice response to the presence of sustainability scores in this model.

Governance preferences also significantly moderated the treatment effect, OR = 1.010, $p < .001$. However, because the dependent variable is selection of the higher-paying employer alternative, the odds ratio above 1 indicates that stronger governance preferences weakened the treatment-induced shift away from the higher-paying employer. Thus, governance-oriented applicants were relatively more likely to continue selecting the higher-paying employer alternative when sustainability scores were displayed. This finding suggests that governance preferences operated differently from environmental preferences in employer choice decisions.

4.4.2 ESG Preferences and Accepted Relative Wage Concessions

The second part of the analysis examined whether ESG preferences moderated the relationship between sustainability score differences and accepted relative wage concessions. The models were restricted to treatment observations because sustainability score differences were only available when sustainability scores were displayed. Separate mixed-effects linear regression models were estimated for environmental, social, and governance preferences. Table 8 reports the corresponding results.

Table 8

Moderating Effect of ESG Preferences on Accepted Relative Wage Concessions.

Variable	Environmental preference model	Social preference model	Governance preference model
Sustainability score difference	0.0079*	0.0124**	0.0166***
	(0.0038)	(0.0047)	(0.0044)
	p = .036	p = .009	p < .001
	[0.0005, 0.0153]	[0.0031, 0.0217]	[0.0079, 0.0253]
ESG preference dimension	0.0127***	-0.0037	-0.0072*
	(0.0038)	(0.0039)	(0.0034)
	p < .001	p = .350	p = .034
	[0.0052, 0.0201]	[-0.0114, 0.0040]	[-0.0139, -0.0005]
Score difference × ESG preference dimension	0.00014	-0.00002	-0.00013
	(0.00011)	(0.00011)	(0.00010)
	p = .204	p = .847	p = .188
	[-0.00008, 0.00035]	[-0.00025, 0.00020]	[-0.00033, 0.00006]
Observations	8,319	8,319	8,319
Participants	2,773	2,773	2,773
Participant random intercept	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: Mixed-effects linear regression models restricted to treatment observations. The dependent variable is accepted relative wage concession (paycut_pct). Reported coefficients are unstandardized. Standard errors are shown in parentheses, followed by exact p-values and 95% confidence intervals in brackets. Each model includes a participant-specific random intercept and controls for the absolute sustainability score of the higher-rated employer, standardized age, gender, salary expectations, and professional experience. The

*ESG preference variable corresponds to the environmental, social, or governance preference allocation in the respective model. The key test of moderation is the interaction between sustainability score difference and the respective ESG preference dimension. The coefficient for sustainability score difference represents its conditional association with accepted relative wage concessions when the respective ESG preference allocation equals zero. The coefficient for the ESG preference dimension represents its conditional association with accepted relative wage concessions when the sustainability score difference equals zero. Adjusted models were estimated using 2,773 participants rather than the full sample of 2,781 because [verified reason]. Table 8 is additionally restricted to treatment observations, yielding three observations per participant. *p < .05, **p < .01, ***p < .001.*

The interaction between sustainability score difference and environmental preference was positive but not statistically significant, b = 0.00014, SE = 0.00011, p = .204, 95% CI [−0.00008, 0.00035]. Environmental preference therefore did not significantly alter the association between sustainability score differences and accepted relative wage concessions. The direct coefficient for environmental preference was positive and statistically significant, b = 0.013, SE = 0.004, p < .001. Because the model includes an interaction term, this coefficient represents the association between environmental preference and accepted relative wage concessions when the sustainability score difference equals zero.

The interaction between sustainability score difference and social preference was not statistically significant, b = −0.00002, SE = 0.00011, p = .847, 95% CI [−0.00025, 0.00020]. Similarly, the interaction between sustainability score difference and governance preference was not statistically significant, b = −0.00013, SE = 0.00010, p = .188, 95% CI [−0.00033, 0.00006]. Although the coefficient for governance preference was negative and statistically significant, b = −0.007, SE = 0.003, p = .034, governance preference did not significantly moderate the association between sustainability score differences and accepted relative wage concessions.

Taken together, the results provide partial support for Hypothesis 3. Environmental and governance preferences significantly moderated the effect of sustainability score presence on employer choice, whereas social preferences did not. None of the three ESG preference dimensions significantly moderated the relationship between sustainability score differences and accepted relative wage concessions. The findings therefore indicate that individual ESG priorities conditioned responses to the presence of sustainability information in employer

choice decisions, but did not systematically condition the translation of incremental sustainability score differences into accepted relative wage concessions.

4.5 Test of Research Question 4: ESG Sub-Criteria Prioritization

Research Question 4 examined which specific ESG sub-criteria applicants prioritized within the environmental, social, and governance dimensions. Participants first allocated relative importance across the three overarching ESG dimensions and subsequently distributed importance points across the six sub-criteria within each dimension. Because the sub-criteria allocations were conducted separately within the environmental, social, and governance dimensions, the resulting mean values are comparable within, but not across, ESG dimensions. Accordingly, Tables 9-11 report separate within-dimension rankings for environmental, social, and governance sub-criteria.

Table 9

Relative Importance Assigned to Environmental Sub-Criteria.

Sub-Criterion	Mean	SD	Rank within dimension
Pollution Prevention	21.49	15.98	1
Climate Change	17.15	13.61	2
Water Management	17.06	10.97	3
Biodiversity Protection	15.31	13.54	4
Circular Economy	15.07	12.72	5
Adaptation Measures	13.92	10.18	6

Table 10

Relative Importance Assigned to Social Sub-Criteria.

Sub-Criterion	Mean	SD	Rank within dimension
Work Conditions	31.38	18.77	1
Health & Safety	20.00	11.97	2
Training	13.84	10.22	3
Diversity	12.92	10.61	4
Human Rights	11.94	9.29	5
Local Communities	9.93	9.41	6

Table 11

Relative Importance Assigned to Governance Sub-Criteria.

Sub-Criterion	Mean	SD	Rank within dimension
Executive Compensation	25.73	19.47	1
Transparency	18.67	13.35	2
Anti-Corruption	14.94	12.05	3
Board Independence	14.87	12.24	4
Risk Management	13.40	9.67	5
Compliance	12.38	10.86	6

Pairwise Wilcoxon signed-rank tests were used to compare participants' allocations across the three overarching ESG dimensions. Social sustainability received significantly greater importance than environmental sustainability, ($z = -47.99$), ($p < .001$). Environmental sustainability received significantly greater importance than governance, ($z = -45.16$), ($p < .001$), while social sustainability also received greater importance than governance, ($z = -2.85$), ($p = .004$). The dimension-level results therefore indicate that participants assigned the greatest relative importance to social sustainability, followed by environmental sustainability and governance.

Within the environmental dimension, pollution prevention received the highest mean allocation (M = 21.49), (SD = 15.98)). Climate change ((M = 17.15), (SD = 13.61)) and water management ((M = 17.06), (SD = 10.97)) followed with nearly identical mean allocations. Biodiversity protection ((M = 15.31), (SD = 13.54)) and circular economy ((M = 15.07), (SD = 12.72)) occupied intermediate positions, whereas adaptation measures received the lowest mean allocation within the environmental dimension ((M = 13.92), (SD = 10.18)).

Within the social dimension, work conditions received the highest mean allocation ((M = 31.38), (SD = 18.77)), followed by health and safety ((M = 20.00), (SD = 11.97)). Training ((M = 13.84), (SD = 10.22)), diversity ((M = 12.92), (SD = 10.61)), and human rights ((M = 11.94), (SD = 9.29)) received lower mean allocations. Local communities received the lowest mean allocation within the social dimension ((M = 9.93), (SD = 9.41)). These descriptive results indicate that participants placed particular emphasis on employment-related social characteristics that are closely connected to their prospective working environment.

Within the governance dimension, executive compensation received the highest mean allocation ((M = 25.73), (SD = 19.47)), followed by transparency ((M = 18.67), (SD = 13.35)). Anti-corruption ((M = 14.94), (SD = 12.05)) and board independence ((M = 14.87), (SD = 12.24)) received almost identical mean allocations. Risk management ((M = 13.40), (SD = 9.67)) and compliance ((M = 12.38), (SD = 10.86)) received the lowest mean allocations within the governance dimension.

Overall, the results reveal distinct prioritization patterns within each ESG dimension. Pollution prevention ranked highest among environmental sub-criteria, work conditions ranked highest among social sub-criteria, and executive compensation ranked highest among governance sub-criteria. At the broader dimension level, participants placed the greatest relative importance on social sustainability. The descriptive sub-criterion results further suggest that applicants placed particular emphasis on organizational characteristics related to employment conditions, workplace safety, environmental prevention, and governance accountability. However, because the sub-criteria were evaluated in separate within-dimension allocation tasks, their mean values should not be interpreted as directly comparable across ESG dimensions.

5. Discussion

5.1 Summary of Key Findings

This study examined whether numerical sustainability scores disclosed in job postings influence employer attractiveness and applicants' willingness to accept lower relative compensation. Drawing on signalling theory and wage trade-off perspectives, the study separates the signalling effect of sustainability information being present from the incremental effect of higher sustainability score differences once applicants can compare such information across employers.

The findings provide clear evidence that sustainability information affects applicants' labor market decisions. First, the mere presence of a sustainability score significantly increased applicants' willingness to accept relative wage concessions. Participants exposed to job postings with sustainability scores accepted wage concessions that were approximately 0.41 percentage points higher than those observed in comparable postings without sustainability information. This finding supports Hypothesis 1 and indicates that sustainability information affects not only attitudinal employer attractiveness but also economically consequential decision behaviour. Supplementary employer choice evidence reinforces this conclusion. Descriptively, participants selected the higher-paying employer alternative in 62.51% of control-condition decisions, whereas this share declined to 53.41% when sustainability information was disclosed. Thus, the presence of sustainability information reduced salary-dominant employer choices by 9.10 percentage points. This behavioural pattern suggests that sustainability disclosures increased the relative attractiveness of employers even when those employers were associated with lower salary offers.

Second, within the treatment condition, sustainability score magnitude also influenced wage concession behaviour. Larger sustainability score differences between competing employer alternatives were associated with greater accepted wage concessions. After controlling for the absolute sustainability score of the higher-rated employer, a one-point increase in sustainability score difference increased accepted wage concessions by approximately 0.012 percentage points. Although statistically significant, this effect was smaller than the effect of sustainability score presence. This pattern suggests that applicants respond strongly to the availability of sustainability information itself, while the numerical magnitude of the score provides additional but more moderate differentiation.

Third, moderation analyses revealed that ESG preferences shaped employer choice decisions but did not systematically alter wage concession behaviour. Environmental preferences strengthened the shift away from the higher-paying employer alternative when sustainability scores were disclosed, whereas governance preferences weakened this shift. Social preferences did not significantly moderate the effect of sustainability score presence on employer choice. In contrast, ESG preference dimensions did not significantly moderate the relationship between sustainability score magnitude and accepted wage concessions. This distinction indicates that ESG preferences may shape how applicants evaluate employer attractiveness, but they do not necessarily translate into stronger monetary trade-offs once compensation is at stake.

Fourth, the analysis of ESG sub-criteria showed that applicants placed the greatest importance on social sustainability dimensions, followed by environmental and governance considerations. Work conditions emerged as the most important sub-criterion overall, followed by executive compensation, pollution prevention, health and safety, and transparency. These results suggest that applicants prioritise sustainability dimensions that are directly observable, employment-related, and personally relevant. More distant or abstract sustainability criteria, such as local community engagement and environmental adaptation measures, received comparatively lower importance.

Taken together, the findings show that sustainability scores operate as labor market signals with measurable behavioural consequences. The strongest effect arises when sustainability information becomes visible in the job posting. Additional score magnitude matters as well, but its effect is smaller. This distinction between signal presence and signal magnitude represents a central contribution of the study.

5.2 Theoretical Implications

This study contributes to several streams of literature at the intersection of sustainability accounting, employer attractiveness, and labor market decision-making.

First, the findings extend signalling theory by demonstrating that numerical sustainability scores can function as labor market signals in recruitment contexts. Prior signalling research has emphasized that observable organizational attributes help applicants infer otherwise difficult-to-observe characteristics such as organizational values, ethical standards, and long-term orientation (Spence, 1973; Spence, 2002; Connelly et al., 2011; Judge & Cable,

1997). This study shows that sustainability scores disclosed in job postings can serve this function. By making sustainability performance visible at the point of employer evaluation, sustainability scores reduce information asymmetry and influence applicant behaviour. The results further refine signalling theory by distinguishing between signal presence and signal magnitude. The mere presence of sustainability information generated a substantially larger effect on accepted wage concessions than incremental differences in sustainability score magnitude. This suggests that applicants may first respond to the visibility and salience of sustainability information itself. Once sustainability information is cognitively available, numerical differences in scores provide additional differentiation, but with smaller marginal effects. This distinction contributes to signalling theory by showing that the activation of a signal may matter more than fine-grained numerical variation in that signal.

Second, the study contributes to the employer attractiveness literature by linking sustainability disclosure to economically consequential applicant behaviour. Much prior research examines employer attractiveness through attitudinal measures, application intentions, or general corporate social responsibility perceptions (Berthon et al., 2005; Highhouse et al., 2003; Chapman et al., 2005; Uggerslev et al., 2012; Turban & Greening, 1997; Greening & Turban, 2000; Jones et al., 2014). This study extends that literature by examining forced-choice employer decisions involving explicit salary trade-offs. The results demonstrate that sustainability information affects not only whether applicants perceive an employer more favourably but also whether they are willing to accept lower relative compensation. Employer attractiveness therefore operates not only as an attitudinal construct but also as a behavioural and economically meaningful preference.

Furthermore, the findings contribute to research on pay-purpose trade-offs. Prior studies suggest that individuals may accept lower wages to work for organizations with social or environmental missions (Burbano, 2016; Besley & Ghatak, 2017; Fehrler & Kosfeld, 2014). This study provides experimental evidence that numerical sustainability information can trigger such trade-offs in a recruitment setting. Importantly, the results show that the effect is not unlimited. The presence of sustainability information produces a meaningful shift in wage concession behaviour, but additional score magnitude produces only moderate incremental effects. This suggests that sustainability can partially substitute for financial compensation, but only within bounded limits.

Fourth, the moderation results refine theoretical assumptions about sustainability preference heterogeneity. The findings indicate that environmental and governance preferences moderated employer choice responses in opposite directions. Environmental preferences strengthened the shift away from the higher-paying employer alternative when sustainability scores were disclosed, whereas governance preferences weakened this shift. In contrast, ESG preferences did not significantly moderate wage concession responses. This distinction suggests that preference heterogeneity is more influential in shaping employer attractiveness evaluations than in shaping monetary sacrifice behaviour. Applicants may differ in how they interpret sustainability information when evaluating employer desirability, but actual willingness to forgo compensation appears less dependent on stated ESG preference dimensions. This finding qualifies overly broad assumptions of pro-social preference theory and suggests that monetary trade-offs may be governed by additional constraints beyond sustainability orientation alone.

Fifth, the ESG sub-criteria results contribute to a more differentiated understanding of sustainability preferences in labor markets. Applicants did not treat all ESG dimensions equally. Social sustainability, particularly work conditions and health and safety, received the strongest priority. This suggests that applicants evaluate sustainability information partly through the lens of employment relevance. Sustainability dimensions that are more closely connected to applicants' immediate work experience appear more influential than more distant or abstract sustainability criteria. This finding helps explain why social sustainability may play a particularly important role in employer attractiveness, even when environmental sustainability dominates many public sustainability debates.

Finally, the study contributes to accounting research by showing that sustainability disclosures may have consequences beyond capital markets and stakeholder reporting. Accounting-reported ESG information is typically discussed in relation to investors, regulators, and external accountability. The present findings suggest that such information can also shape labor market outcomes when translated into recruitment communication. This broadens the relevance of sustainability accounting by demonstrating that ESG disclosure may influence internal and external organizational resource acquisition, including talent attraction.

5.3 Practical Implications for Employers and HR Managers

The findings offer several practical implications for employers, HR managers, and sustainability communication professionals.

Organizations should recognize that sustainability information can influence recruitment outcomes when it is made visible in job postings. The study shows that applicants exposed to sustainability scores were more willing to accept lower relative compensation and less likely to choose the higher-paying employer alternative. This does not imply that sustainability communication can replace competitive compensation. However, it suggests that transparent sustainability information may reduce applicants' exclusive reliance on salary as the dominant decision criterion.

Also, the results indicate that simply making sustainability information visible may be particularly important. The effect of sustainability score presence was substantially larger than the effect of incremental score magnitude. For employers, this means that the absence of sustainability information in job postings may represent a missed signalling opportunity. Even if companies already disclose sustainability information in annual reports, sustainability reports, or regulatory filings, such information may not influence applicants unless it is integrated into recruitment touchpoints where job decisions are made.

The results have furthermore implications for companies facing growing sustainability reporting requirements. Sustainability disclosures generated for regulatory purposes, such as those associated with CSRD-related reporting, may also generate strategic value in talent acquisition if communicated appropriately. Rather than treating sustainability reporting solely as a compliance obligation, organizations can translate selected sustainability information into recruitment communication. This may allow companies to leverage reporting investments across multiple organizational functions.

From a cost-management perspective, these findings further suggest that sustainability communication may have indirect implications for personnel costs. Because applicants exposed to sustainability information were more willing to accept lower relative compensation, credible sustainability disclosures may reduce the extent to which employers must rely exclusively on salary premiums to attract applicants. This does not imply that sustainability communication should be used to suppress wages or substitute for fair compensation. Rather, sustainability information may complement compensation by

strengthening the non-monetary component of the employer value proposition. In this sense, sustainability investments and related disclosures may contribute to recruitment efficiency by improving employer attractiveness and potentially reducing compensation pressure in competitive labor markets.

For HR managers, the findings imply that sustainability communication should not be treated as generic employer branding, but as a targeted component of the employer value proposition. Applicants appear to differentiate between sustainability dimensions and sub-criteria, with social sustainability aspects, particularly work conditions and health and safety, emerging as highly salient. Recruitment communication should therefore not merely highlight broad ESG performance but translate sustainability into employment-relevant terms that applicants can connect to concrete workplace implications, such as fair working conditions, employee well-being, occupational safety, transparency, and responsible management practices. Numerical sustainability scores may be useful because they are concise, comparable, and easy to process, but they should complement rather than replace contextual sustainability communication. Employers could therefore integrate sustainability information directly into the company description of a job posting or add a dedicated sustainability section that briefly explains the dimensions underlying the overall score. For instance, a job posting might display an overall sustainability score while also indicating specific strengths in work conditions, transparency, or pollution prevention. At the same time, HR managers should interpret the wage concession findings carefully. Although sustainability information increased accepted relative wage concessions, this should not be understood as a justification for systematically lowering wages. Competitive pay remains central to employer attractiveness. A more appropriate implication is that sustainability information can strengthen the overall employer value proposition and may help organizations compete for talent when salary offers are not the sole differentiating factor. Sustainability communication should therefore complement fair compensation rather than substitute for it.

Finally, the heterogeneity findings suggest that sustainability communication may appeal across diverse applicant groups. The score magnitude effect was generally positive across gender, age, education, employment status, professional experience, career level, and application intention. This generalizability is practically relevant because it suggests that sustainability scores do not need to be targeted narrowly to a small subgroup of applicants.

At the same time, the results also indicate that applicant context matters. Career entrants and applicants in more transitional labor market positions appeared particularly responsive to increasing sustainability score differences, whereas experienced professionals responded less strongly than career entrants. Employers targeting experienced professionals may therefore need to combine sustainability information with additional career-related value propositions, such as development opportunities, leadership responsibilities, job security, or career progression.

5.4 Limitations and Future Research

Despite its contributions, this study has several limitations that provide opportunities for future research.

A first limitation concerns the experimental nature of the decision setting. The study used hypothetical forced-choice employer decisions rather than actual job applications or employment contract decisions. Although forced-choice designs provide a controlled setting for observing trade-offs between salary and sustainability information, hypothetical decisions may differ from real labour-market behaviour. (Haghani et al., 2021; Hainmueller et al., 2015). Future research should therefore examine whether similar effects emerge in field experiments, real job application settings, or recruitment platforms where applicants face consequential decisions.

The generalizability of the findings warrants further investigation. The study was conducted among working-age adults residing in Germany. Applicant responses to sustainability information may differ across countries because of differences in regulatory environments, labor market institutions, cultural values, and familiarity with sustainability disclosures. Replications in other national contexts would therefore help establish the boundary conditions of the observed effects. Applicant responses to sustainability information may differ across countries with different regulatory environments, labor market institutions, cultural values, and levels of sustainability awareness. Replications in other national contexts would therefore help assess the boundary conditions of sustainability score effects.

Another limitation relates to the use of fictitious sustainability scores rather than scores tied to real companies. This design choice was necessary to ensure experimental control, enable systematic manipulation of sustainability score presence and magnitude, and avoid confounding sustainability information with prior employer reputation or brand familiarity.

However, applicants in real labor markets may interpret sustainability scores differently when they are attached to known employer brands. Future research could therefore examine how sustainability score effects interact with employer familiarity, brand reputation, industry affiliation, or prior CSR reputation.

The format of sustainability disclosure represents an additional avenue for future research. The treatment design relied on standardized numerical sustainability scores, whereas ESG information in practice can be communicated through narrative statements, certification labels, rankings, traffic-light systems, external ratings, or detailed sustainability reports. Comparing these alternative disclosure formats would help clarify whether numerical scores are more effective than narrative sustainability communication or third-party certifications in shaping applicant evaluations.

The present design did not manipulate or directly measure the perceived credibility of the sustainability score. The source of the score, its production costs, and its external verification status were not experimentally varied. The findings should therefore be interpreted as responses to displayed numerical sustainability information rather than as evidence regarding the effectiveness of costly or independently verified sustainability signals. Future studies could manipulate whether scores are self-reported by the employer, issued by an external rating agency, verified by an auditor, or based on mandatory reporting requirements.

A methodological limitation arises from the fixed sequence of experimental conditions. Participants first completed control tasks and then treatment tasks. This structure avoided exposing participants to sustainability information before the control condition, but it may also introduce order effects (Greenwald 1976; Salkind, 2010). Although task order and employer presentation positions were randomized, future research could examine alternative designs that counterbalance condition order while still minimizing contamination between control and treatment conditions.

The measurement of sustainability preference heterogeneity also leaves room for refinement. Although the study used constant-sum allocations to capture relative ESG priorities, such measures reflect stated preferences rather than deeper motivational orientations (Schwartz et al., 2012). Future research could complement allocation measures with validated psychometric scales capturing pro-social motivation, environmental values, moral identity,

or public service motivation. This would allow researchers to distinguish between stated ESG prioritization and broader value-based applicant characteristics.

Another boundary condition concerns the economic magnitude of score effects. The score magnitude effect was statistically significant but modest, whereas the mere presence of sustainability information produced a stronger effect than additional variation in sustainability score differences. Future research should investigate when score magnitude becomes more consequential. Potential moderators include industry context, job type, applicant sustainability literacy, perceived credibility of the score, and economic conditions affecting job search behaviour.

Finally, sustainability disclosures may generate heterogeneous effects across organizational contexts. Sustainability scores may matter more in industries with high environmental impact, stronger public scrutiny, or more intense competition for skilled labor. They may also interact with other job attributes, such as remote work, career development opportunities, job security, or organizational purpose. Understanding these interactions would help specify when sustainability information becomes a decisive component of employer attractiveness.

6. Conclusion

This study examined whether numerical sustainability scores disclosed in job postings influence employer attractiveness and applicants' willingness to accept lower relative compensation. Building on signalling theory and wage trade-off perspectives, the study separated the signalling effect of sustainability information being present from the incremental effect of higher sustainability score differences once applicants can compare such information across employers.

Using a pre-registered forced-choice experiment with 2,781 German working-age adults and 16,686 employer choice observations, the findings demonstrate that sustainability scores have measurable consequences for labor market decision-making. The mere presence of sustainability information significantly increased accepted relative wage concessions and reduced salary-dominant employer choices. Larger sustainability score differences further increased applicants' willingness to accept wage concessions, although this effect was substantially smaller than the initial signalling effect generated by making sustainability information visible.

These findings suggest that sustainability investments can create strategic value beyond regulatory compliance when they are communicated effectively in recruitment contexts. For companies, sustainability performance should not remain confined to sustainability reports, investor communication, or regulatory filings. Instead, sustainability information can become part of the employer value proposition when it is translated into visible, credible, and applicant-relevant signals in job postings. By communicating sustainability scores transparently, employers may strengthen perceived employer attractiveness and differentiate themselves from competitors in labor markets where applicants compare job offers across multiple monetary and non-monetary attributes.

The results also show that sustainability information can influence salary-related decision-making. Applicants exposed to sustainability scores were more willing to accept lower relative compensation, indicating that sustainability signals may reduce applicants' exclusive reliance on salary as the dominant employer-choice criterion. This does not imply that sustainability communication can replace fair or competitive pay. Rather, sustainability information appears to complement compensation by adding a meaningful non-monetary component to the employer value proposition. From a managerial perspective, this suggests

that investments in sustainability may support recruitment efficiency and potentially reduce the need to compete solely through salary premiums, provided that such sustainability efforts are credibly communicated to applicants.

The study further shows that applicants do not evaluate sustainability as a homogeneous construct. Social sustainability aspects, particularly work conditions and health and safety, received especially strong priority. This indicates that sustainability communication in job postings should be connected to employment-relevant issues rather than presented only as abstract ESG performance. Employers may benefit from highlighting how sustainability commitments translate into fair working conditions, employee well-being, organizational accountability, and responsible management practices.

Overall, this study provides experimental evidence that employer-choice and wage-concession decisions differed between score-free tasks and subsequent tasks displaying numerical sustainability information. The findings suggest that sustainability disclosures may function as relevant labor-market signals when applicants compare employer alternatives. Counterbalanced, between-subject, or field experiments are needed to establish the condition difference of displaying sustainability scores in job postings.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work the author(s) used ChatGPT-4o in order to support an author to express content in a non-native language. After using this tool, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the published article.

Declaration of Interest

The author declares that there are no financial or personal relationships that could have inappropriately influenced the work reported in this paper.

Appendices

Appendix A. Company profiles

Employer Profile A

The company is a medium-sized firm that has operated successfully in the market for many years. It has an established customer base, clearly defined procedures, and a relatively traditional organizational structure comprising several departments. Management places considerable emphasis on reliable results, predictable processes, and stable economic development.

Employer Profile B

The company is a large organization operating across multiple regions and locations. It serves a changing customer base and is managed by an experienced management team with several hierarchical levels. Its primary objectives are continued growth, reaching new customer groups, and securing its market position over the long term.

Employer Profile C

The company is a comparatively small and rapidly growing firm. It has acquired many new customers within a short period and continues to develop dynamically. Its structures are less formalized, decisions are often made quickly, and employees frequently work in small, closely collaborating teams.

Notes: Participants were presented with the employer profiles in German. The English-language versions reported here are translations prepared for publication. The translations preserve the substantive meaning and structural differences of the original experimental materials.

Appendix B. Variable Definitions and Coding

Table 12

Task-Level Variables.

Variable	Definition and coding	Level	Analytical role
choice_high	Equals 1 if the participant selected the higher-paying employer alternative and 0 if the lower-paying employer alternative was selected.	Task	Binary dependent variable
paycut_pct	Equals 0 if the participant selected the higher-paying employer alternative. If the lower-paying employer alternative was selected, the variable was calculated as (salary_diff_value / salary_expectation) × 100. Higher values indicate that the participant selected an alternative that offered a larger amount less than the available higher-paying alternative, relative to the participant's stated minimum salary expectation. Because both offers met or exceeded the participant's stated minimum salary expectation, the variable does not represent acceptance of compensation below that expectation.	Task	Continuous dependent variable
treatment	Equals 1 when numerical sustainability scores were displayed and 0 when no sustainability scores were displayed. The score-free condition always preceded the score-disclosure condition.	Task	Experimental-condition predictor

Variable	Definition and coding	Level	Analytical role
score_diff	Difference between the higher and lower sustainability scores displayed in a score-disclosure task. The measure is non-negative, with 0 indicating identical scores and higher values indicating a larger score difference. The variable is not defined for score-free tasks.	Task	Treatment-intensity predictor
score_high	Sustainability score of the higher-rated employer alternative in a score-disclosure task. The variable is not defined for score-free tasks.	Task	Control for the absolute score level
salary_diff_value	Difference between the higher and lower annual gross salary offers presented in a choice task. The value is positive because one alternative always offered a strictly higher salary than the other.	Task	Task-level control

Table 13

Participant-Level Variables.

Variable	Definition and coding	Level	Analytical role
esg_environment	Number of points allocated to the environmental dimension in the constant-sum ESG preference measure. Participants allocated a total of 100 points across esg_environment, esg_social, and esg_governance.	Participant	Moderator and descriptive variable
esg_social	Number of points allocated to the social dimension in the constant-	Participant	Moderator and

Variable	Definition and coding	Level	Analytical role
	sum ESG preference measure. Participants allocated a total of 100 points across esg_environment, esg_social, and esg_governance.		descriptive variable
esg_governance	Number of points allocated to the governance dimension in the constant-sum ESG preference measure. Participants allocated a total of 100 points across esg_environment, esg_social, and esg_governance.	Participant	Moderator and descriptive variable
salary_expectation	Participant's stated minimum acceptable annual gross base salary, excluding bonuses and other variable compensation components. Participants were required to enter a value of at least €10,000; no upper entry limit was imposed. The variable was also used as the denominator in the construction of paycut_pct.	Participant	Control and salary benchmark
age_z	Standardized participant age, calculated by subtracting the sample mean age from the participant's age and dividing the result by the sample standard deviation of age.	Participant	Control
female	Equals 1 for female participants and 0 for male participants.	Participant	Control and exploratory

Variable	Definition and coding	Level	Analytical role
			heterogeneity variable
experience_years_num	Categorical professional-experience measure comprising no experience, less than one year, one to three years, four to six years, seven to ten years, and more than ten years. One to three years served as the reference category in the regression models.	Participant	Control and exploratory heterogeneity variable
education_num	Highest educational qualification, entered as a categorical variable. The categories comprised high school diploma, bachelor's degree, habilitation, lower secondary school certificate, no school certificate, master's degree or diploma, master craftsman qualification, doctorate, intermediate secondary school certificate, and state examination.	Participant	Exploratory heterogeneity variable
employment_status_num	Current employment or educational status, entered as a categorical variable. The categories comprised job-seeking, vocational training, school student, bachelor student, master student, part-time employed, and full-time employed.	Participant	Exploratory heterogeneity variable

Variable	Definition and coding	Level	Analytical role
career_level_num	Type of position the participant would seek, categorized as career entrant, experienced professional, or managerial position.	Participant	Exploratory heterogeneity variable
application_intent_num	Stated likelihood of applying for a new position within the next 12 months, categorized as definitely unlikely, rather unlikely, rather likely, or definitely likely to apply for a new job.	Participant	Exploratory heterogeneity variable
task_id	Technical dataset identifier used to identify participants and to specify participant-level random intercepts in the mixed-effects models. Despite its technical name, the variable remains constant across the repeated task observations contributed by the same participant.	Participant	Clustering variable

Notes: Task-level variables vary across the repeated employer-choice tasks, whereas participant-level variables remain constant across the observations contributed by the same participant. score_diff and score_high are defined only for score-disclosure tasks because sustainability scores were not displayed in the score-free condition. Participants allocated a total of 100 points across esg_environment, esg_social, and esg_governance. The technical variable name paycut_pct is retained to ensure consistency with the preregistration and the statistical analysis files. Its definition should not be interpreted as an actual pay cut or as acceptance of compensation below the participant's stated minimum salary expectation. The ESG sub-criteria examined for Research Question 4 are reported using their substantive questionnaire-item labels in the corresponding descriptive tables.

They are not listed as separate variables in this table because no separate variable names for these items are introduced in the manuscript.

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Data Availability

Data will be made available on request.

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