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Development of an Integrated Approach to Risk Management with Consideration of ESG Factors in Large Corporations

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ABSTRACT: The article examines the transformation of corporate risk management in the context of increasing relevance of ESG factors. It analyzes methodological aspects of integrating environmental, social, and governance parameters into the risk management systems of large companies. The study emphasizes that successful ESG integration requires a shift from reactive to strategically oriented models based on scenario analysis, digital tools, and data governance. Case studies of Microsoft, Coca-Cola, and ExxonMobil are discussed, demonstrating mature integration of ESG metrics into ERM practices, including climate targets, resilience scenarios, and assurance of non-financial disclosures. A step-by-step roadmap for embedding ESG into corporate risk systems is presented – from diagnostics and methodological alignment to institutionalization and board-level oversight. The article highlights the strategic role of ESG as a driver of resilience, transparency, and investor trust.

KEYWORDS: ESG factors, risk management, sustainable development, corporate strategy, non-financial reporting, scenario analysis.

I. INTRODUCTION

The modern corporate world has increasingly complex risk structures, well beyond the economic and operational dimensions to include significant environmental and social issues. Within the global agenda of sustainability, increased regulatory demands, and the rise of investors who are showing interest in nonfinancial metrics, companies remain under pressure to reconsider their system of risks. Traditional models, mainly targeted at financial and production-related risks, could not meet the multidimensional influence of ESG factors that gave birth to new types of strategic and reputational risks. This context underscores the need for an integrated approach that aligns risk management mechanisms with the principles of sustainable development within a unified corporate governance framework.

The objective of this study is to analyze the evolution of integrated risk management models, identify their methodological features, and evaluate their effectiveness in large corporations. Particular attention is given to practical examples of integrated risk management implementation, illustrating the shift from reactive to proactive risk governance within ESG-oriented business strategies.

II. MAIN PART. THE EVOLUTION OF THE INTEGRATED RISK MANAGEMENT CONCEPT

The concept of risk management in the corporate environment has historically evolved from fragmented models focused on controlling individual threats to systemic approaches that enable a comprehensive understanding of risks as interrelated components within a unified management structure [1]. In its early stages, the emphasis was primarily on financial risks and insurance, while non-financial factors were considered peripheral. When global markets got established and the business process became so complicated, the need for a holistic methodology that embraced strategic, operational, legal, and reputational risks was felt. It was during this time-the late 20th to early 21st century-that the concept of enterprise risk management (ERM) began to take center stage, as outlined in the respective COSO Committee of Sponsoring Organizations of the Treadway Commission's documents and in ISO 31000 standards, turning into the cornerstone of integrated risk management systems [2].

The modern understanding of integrated risk management goes beyond traditional financial rationality and is grounded in the principle of systemic interaction across all levels of corporate governance (table 1).

TABLE 1. COMPARATIVE CHARACTERISTICS OF RISK MANAGEMENT APPROACHES [3, 4]

Criterion	Traditional risk management approach	Enterprise risk management
Focus of management	Management is carried out by separate risk categories, mainly financial.	All categories of risks are considered – strategic, operational, financial, reputational, etc.
Main methods	Local tools are used: insurance, internal control, audit.	Includes: identification; assessment; strategy development; response; monitoring and risk review.
Level of involvement	Participation is limited to specific departments; usually without coordination with others.	All organizational levels are involved in the risk management process, including the board and operations.
Time horizon	Focus is on short-term threats and consequences.	Focus is on medium- and long-term risks, in the context of sustainability and strategic goals.
Link to corporate strategy	Risk management is carried out separately from the strategic planning process.	Risk management is integrated into the development and implementation of corporate strategy.
Regulatory and methodological basis	Internal policies and informal regulations prevail, and the formal structure is often missing.	The internationally adopted standards are COSO-ERM and ISO 31000 among other framework concepts.

In recent years, the concept of sustainable development has considerably altered the path of ERM development and gave a push to the creation of ESG-oriented risk management models. These models take into consideration the influence of ESG factors on the financial stability of an enterprise and its reputation and permit the construction of long-term strategies for lessening negative impacts and strengthening business resilience.

According to the FERMA Global Risk Manager Survey Report 2024, which surveyed over 1,000 respondents from 77 countries, 57 % of risk managers are involved in the assessment of ESG-related risks (fig. 1).

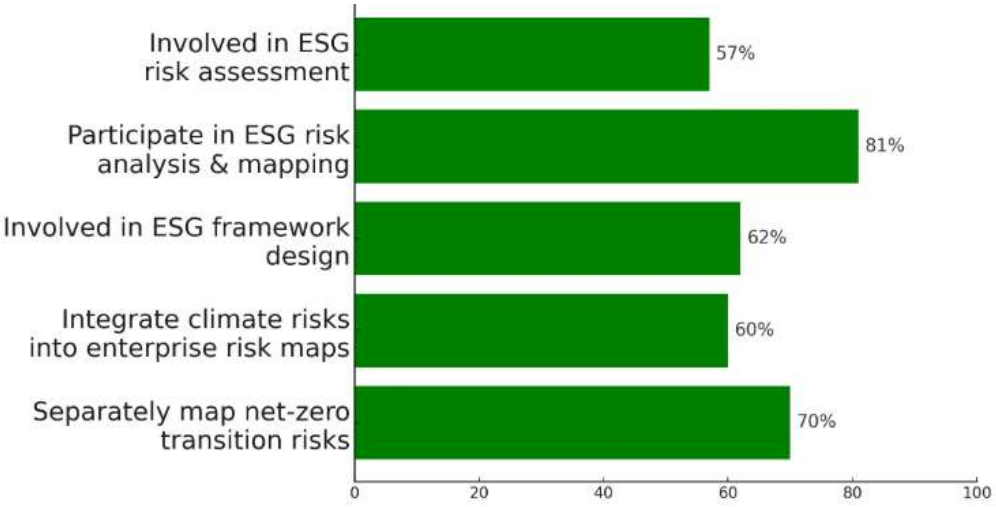

Figure 1. Share of respondents involved in key elements of ESG-oriented risk management [5]

Overall, today's organizations are considering a bottom-up approach to ERM, one which increasingly combines quantitative and qualitative analysis methods, including scenario modeling, ESG scoring, and automated risk monitoring. In sum, this transformation is part of a new managerial paradigm in which the approach to the management of risk becomes an instrument for strategic development toward long-term sustainability and stakeholder trust.

III. THE STRATEGIC IMPACT OF ESG FACTORS ON CORPORATE RISK MANAGEMENT

Generally speaking, ESG factors continue to realign some of the fundamental precepts and structures underlying corporate risk assessment and management. Environmental risks like greenhouse gas emission, ecological catastrophes, and poor resource management have ceased to be confined to high-polluting industries and include, among others, financial ones dealing with investments in such industries. Social aspects, including labor rights, workplace safety, gender equality, and community involvement, increasingly have a measurable impact on the magnitude of both operational and reputational risk. Governance-related factors include corporate structure, transparency, anti-corruption policy, and compliance mechanisms that directly influence stakeholder confidence and even lead to a reduction of legal and regulatory risks.

These developments demand a re-evaluation of conventional risk paradigms. Companies must not only identify emerging ESG-related risks but also reassess the magnitude and probability of existing threats through the lens of sustainability. ESG metrics should therefore be embedded within a company's strategic risk profile, functioning as integral rather than auxiliary indicators. The integration of ESG parameters into ERM frameworks thus becomes indispensable for regulatory alignment, increased investor appeal, and long-term business resilience. In addition to internal risk frameworks, increased external regulatory pressure further amplifies the need for consistent ESG risk identification and disclosure.

Breach of sustainability-related disclosure obligations and due diligence practices also exposes organizations to regulatory and legal risks emanating from emerging standards on sustainability and climate-related disclosures, including scenario analysis and emission metrics, industry-specific requirements in terms of resource handling and operational safety, and mandatory due diligence in supply chains with respect to human rights, environmental protection, and ethical practices (table 2).

TABLE 2. MAIN SOURCES OF REGULATORY AND LEGAL ESG RISKS [6, 7]

Requirement category	Description	Examples of standards / acts
Disclosure of ESG and climate-related information	Mandatory publication of ESG-related data, climate scenario analyses, risk metrics (including Scope 1–3 emissions).	• SEC Climate Disclosure Rule (USA); • TCFD (Task Force on Climate-related Financial Disclosures); • ESRS (EU); • IFRS S1/S2 (ISSB).
Sectoral environmental and technical standards	Mandatory or recommended standards on resource use, emissions control, environmental protection, and safety.	• EPA Clean Air Act / Clean Water Act (USA); • ISO 14001; • EU Industrial Emissions Directive.
Due diligence in supply chains	Corporate obligations to ensure transparency, human rights protection, environmental responsibility, anti-corruption in supply chains.	• US Uyghur Forced Labor Prevention Act; • German Supply Chain Due Diligence Act (LkSG); • OECD Guidelines for MNEs; • EU CSDDD (pending adoption).

ESG-related regulations have been increasingly tightened across jurisdictions, driven both by regional and global standard-setting initiatives. In the United States, ESG-related regulatory pressure goes beyond federal climate disclosure requirements-for instance, the SEC Climate Disclosure Rule-and environmental regulations issued by the Environmental Protection Agency to include specialized legislation that targets ethical practices in global supply chains. One notable example is the Uyghur Forced Labor Prevention Act, which puts stringent import restrictions on goods linked to forced labor in a manner highlighting human rights due diligence across supplier networks.

In the European Union, the regulatory intensity is increasing with the introduction of the CSDD and the application of the ESRS framework's mandatory sustainability reporting requirements within the greater context of the CSRD. On an international level, there are initiatives like the TCFD and ISSB that further harmonize the ESG and climate disclosure requirements, substantially heightening the compliance burden, particularly for those companies operating in multiple countries.

Non-compliance with ESG disclosure requirements and sustainability due diligence may lead to significant financial and reputational damages. In addition, companies could be liable to face monetary penalties, limited access to the capital markets and insurance, and even downgrades in credit and ESG ratings. A growing importance is attached to the risk of greenwashing-or, in other words, misrepresenting and/or exaggerating environmental and social performance-which raises a demand for verifiable and transparent reporting.

According to S&P Global Ratings, close to 13 % of corporate and infrastructure rating actions between April 2020 and December 2023 were directly driven by ESG considerations; over 75 % of those actions were negative. Downgrades by one notch were more frequent in ESG-related decisions than in the broader sample. The region with the highest concentration of ESG-related breaches was North America (fig. 2).

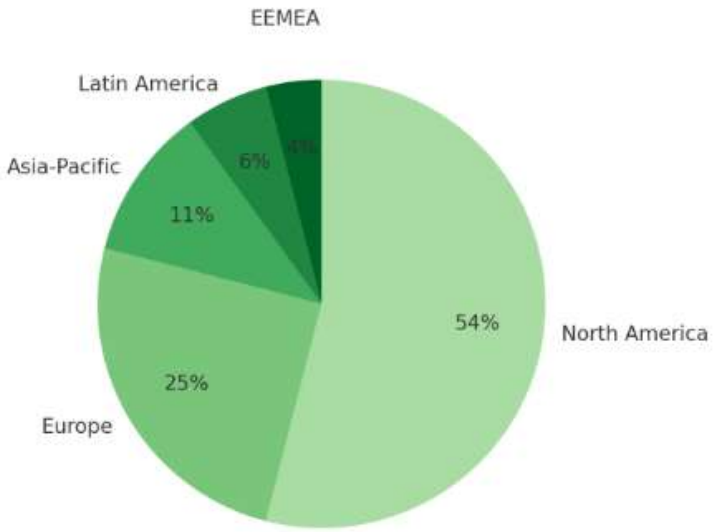

Figure 2. Geographic Distribution of ESG-Related Rating Actions, % [8]

A more detailed breakdown of ESG-related rating actions in 2020–2023 reveals that social factors accounted for the vast majority – 851 out of 1,009 cases (approximately 84 %). Among these, an overwhelming number were linked to occupational health and safety issues (844 cases), with the highest concentration in North America (454), followed by Europe (220), Asia-Pacific (93), Latin America (48), and EEMEA (29). Environmental factors contributed 61 actions (around 6 %), primarily associated with transition risks (36) and physical climate risks (20). Governance-related factors resulted in 97 actions (approximately 10 %), mainly concerning risk management, corporate culture, and oversight structures (47 cases), as well as board composition and corporate governance frameworks (24), and transparency/reporting issues (13). In geographic terms, ESG events that influenced credit ratings were most prevalent in North America (54 %), followed by Europe (25%), Asia-Pacific (11 %), Latin America (6 %), and EEMEA (4 %). This distribution broadly mirrors the overall pattern of rating actions across all categories.

Today, non-financial reporting is no longer merely a communication tool – it functions as an operational component of the corporate risk management system [9]. It enables companies to identify, assess, and monitor ESG-related risks on a continuous basis. Its practical value depends on three key dimensions: comparability of metrics, quality of underlying data, and the presence of independent assurance. The use of standardized taxonomies and performance indicators allows companies to reflect ESG factors within their business models and value chains, linking operational drivers – such as energy intensity, injury rates, employee turnover, and compliance incidents – to financial outcomes, including profit margins, working capital, and weighted average cost of capital (WACC). Integrating non-financial metrics into the corporate risk register and key risk indicators (KRIs) enhances early-warning capabilities and improves the accuracy of scenario analysis, particularly in the assessment of transition and physical climate risks. Achieving this requires robust data governance frameworks, unified metric reference systems, and well-defined data quality control procedures, as well as alignment between ESG disclosures, risk appetite, and executive remuneration systems. As a result, non-financial reporting evolves from a stakeholder communication channel into a strategic instrument for precise ESG risk identification and monitoring, thereby improving the overall effectiveness of integrated risk management.

According to the report by IFAC and AICPA & CIMA, nearly all large companies published sustainability information in 2023 (fig. 3).

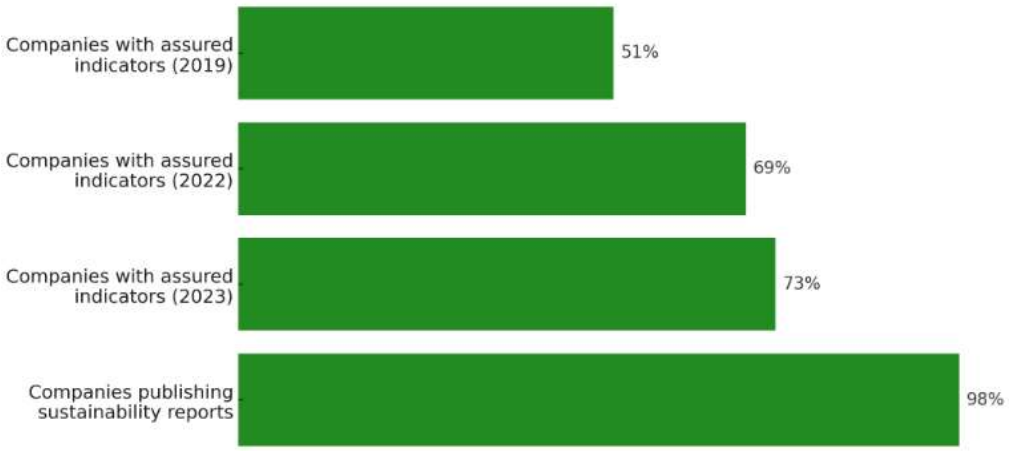

Figure 3. Dynamics of sustainability reporting and assurance among large companies [10]

At the same time, audit firms remain the primary providers of assurance services for non-financial reports, accounting for 55 % in 2023. This represents a slight decrease from 58 % in 2022, explained by report consolidation and increased activity of non-audit providers in the GHG segment. In total, the share of audit firms is increasing in various markets: Singapore (+6 percentage points), South Africa (+4), the United Kingdom (+5), and the United States (+5; from 23 % to 28 %). More than three-quarters of companies now include sustainability disclosures in their annual or integrated reports and increasingly assign assurance to their statutory auditor, thus converging with financial reporting practices.

Thus, ESG factors are evolving from optional elements of corporate policy into very important parameters of the assessment of business resilience and reliability, with influences extending to disclosure principles, regulatory compliance, access to financing, and the cost of capital.

IV. EXAMPLES OF ESG INTEGRATION INTO RISK MANAGEMENT SYSTEMS OF MAJOR U.S. CORPORATIONS

Many large American corporations demonstrate a mature approach to integrating ESG factors into their risk management systems. Unlike the declarative strategies of the past, current practices involve clearly defined quantitative targets, the use of digital monitoring tools, and the incorporation of environmental, social, and governance risks into corporate risk registers and risk maps [11].

At Microsoft, ESG risk management is embedded into the company's strategic architecture as a core component of long-term risk governance. In the 2025 Environmental Sustainability Report, it was announced that the company had procured nearly 22 million metric tons of carbon removals, doubling down on its pledge to reach carbon negativity no later than 2030 [12]. The company also announced a decline in Scope 1 and 2 emissions to approximately 14.857 million metric tons of CO_2 in fiscal year 2024, from 15.13 million in 2023. On the other hand, total emissions including Scope 3 have increased by 23.4 % compared to 2020, reflecting the growing complexity of indirect value chain risks. These dynamics underscore Microsoft's proactive approach to managing both transition and physical climate risks – through sustained investments in carbon capture technologies (CCS), renewable energy procurement, and the development of low-carbon infrastructure, such as sustainable data centers.

Thus, Microsoft does not view ESG factors as an additional reporting element, but rather as a systemic component of its ERM model – capable of mitigating emissions impact, ensuring compliance with emerging regulatory standards, and strengthening resilience to reputational, operational, and financial risks.

The Coca-Cola Company is one of the world's leading companies in the beverage and packaging industry, showcasing a mature risk management of ESG issues by integrating the natural environment as a metric into the corporate ERM framework. According to the 2024 Environmental Update, the total GHG emissions from manufacturing activities (Scopes 1, 2 and 3, market-based) were 4.95 million metric tons of CO_2-equivalent in 2023, slightly down from 4.97 million in 2022, while renewable electricity reached 28 % across the system in 2024 [13]. The updated climate targets aligned with a pathway of 1.5 °C by 2035 and embedded climate risks into the long-term strategy of the company. Coca-Cola relies on Science Based Targets, discloses data annually through CDP, and obtains limited external assurance for key indicators. In 2024, it expanded GHG accounting boundaries and aligned Scopes 1 and 2 with the GHG Protocol Corporate Standard, enhancing its ability to assess and mitigate transition and physical climate risks such as carbon regulation and supply chain disruptions.

Development of an Integrated Approach to Risk Management with Consideration of ESG Factors in Large Corporations

As the representative of the energy sector, ExxonMobil mainly integrates ESG factors into the strategic risk management system through climate scenario analysis and asset carbon-intensive asset revaluation [14]. The company has committed to reaching net-zero greenhouse gas emissions up to 2050 for scopes 1 and 2 from operated assets, with its 2030 targets being a reduction of corporate-wide GHG intensity by 20-30 %, upstream intensity by 40-50 %, methane intensity by 70-80 %, and flaring intensity by 60-70 % relative to 2016 levels.

According to the ExxonMobil 2024 Sustainability Report, the total Scope 1 and 2 emissions from operated assets reached 98 million metric tons of CO_2-equivalent, with intensity declining from 27.5 to 22.6 t CO_2-e per 100 t of production (an 18 % decrease compared with 2016). Flaring emissions dropped from 16 to 6 million metric tons CO_2-e. These indicators form the key parameters of the assessment of exposure to the tightening of carbon regulation and possible depreciation of the carbon-intensive or stranded assets.

To mitigate transition risks, ExxonMobil plans to invest up to $30 billion in low-carbon projects between 2025 and 2030, allocating roughly 20 % of capital expenditures to CCS, hydrogen, biofuels, lithium, and low-carbon materials initiatives. The company already operates the largest CO_2 pipeline network in the U.S. and has signed contracts to transport and store up to 8.7 million metric tons of CO_2 per year, targeting 30 million metric tons per year by 2030. It also estimates the potential to reduce third-party emissions by over 50 million metric tons CO_2-e annually by 2030 through CCS, hydrogen, and low-carbon fuel projects. Portfolio resilience is additionally tested against scenarios aligned with the Paris Agreement, including the IEA Net Zero Emissions (NZE) Scenario, thereby institutionalizing climate factors as an integral element of ExxonMobil's investment and strategic risk management framework.

Case analysis demonstrates the institutionalization of ESG factors within the corporate risk management systems of leading U.S. companies. The integration of environmental and climate metrics into strategic planning, investment evaluation, and scenario modeling processes reduces vulnerability to transition and physical risks, thereby enhancing business model resilience to regulatory, market, and reputational challenges.

V. PRACTICAL TOOLS AND METHODOLOGIES FOR ESG-ORIENTED RISK MANAGEMENT

The integration of ESG factors into corporate risk management requires a shift from declarative approaches to the use of structured methodologies, digital tools, and the incorporation of non-financial metrics into decision-making processes [15]. Current practice shows that the successful implementation of ESG-oriented risk management is based on a combination of regulatory frameworks, analytical instruments, and verification mechanisms.

The development of an integrated risk management approach that incorporates ESG factors involves a gradual transformation of the existing risk management system rather than the selective addition of isolated indicators. For large corporations, the implementation of ESG-oriented risk management should be viewed as a roadmap comprising several interrelated stages – from diagnostics and methodological alignment to the creation of digital data infrastructure, scenario analysis, and the institutionalization of the Board of Directors' oversight role (table 3).

TABLE 3. ROADMAP FOR INTEGRATING ESG FACTORS INTO A COMPANY'S RISK MANAGEMENT SYSTEM

Stage	Main content	Key tools and methods
1. Diagnosis and problem setting	Analysis of regulatory requirements, investor expectations, and the current ERM model; identification of ESG risks and areas of high vulnerability.	ERM gap analysis, interviews with key stakeholders, initial ESG risk mapping, materiality matrix.
2. Methodological integration of ESG into ERM	Incorporation of ESG factors into risk appetite, risk register, and risk maps; development of KRIs and linkage with KPIs.	Updated policies and risk appetite, ESG risk register, risk maps, ESG KRIs, revised risk assessment methodologies.
3. Data infrastructure and digital solutions	Development of a unified ESG taxonomy, setup of data collection and verification processes, implementation of digital platforms.	ESG taxonomy, data governance procedures, BI dashboards, electronic risk register, integration with reporting and planning systems.
4. Scenario analysis and stress testing of ESG risks	Modelling of transition and physical climate and social scenarios; assessment of impacts	Scenario analysis (incl. climate scenarios), stress tests, sensitivity analysis, "what-if" modelling.

	on financial performance and business model resilience.	
5. Institutionalization and oversight	Formalization of the roles of the Board of Directors and committees; inclusion of ESG risks in the regular agenda; external assurance of non-financial reporting.	Board and committee charters, procedures for reviewing ESG reports, external assurance processes, management incentive schemes including ESG metrics.

Effective ESG-oriented risk management can only be ensured if an approach is systematic and continuous. Not only does the practical value of such a course rest in enhanced protection against climate, social, and regulatory risks, but it also builds a culture of managerial responsibility rooted in data and transparency. Continuing application of the proposed roadmap will allow companies to turn ESG factors from an external obligation of compliance into a tool for strategic resilience, enhancing the quality of corporate governance and strengthening investor confidence.

CONCLUSIONS

The integration of ESG factors into corporate risk management systems represents not merely a response to rising regulatory and societal expectations, but a fundamental transformation of the managerial paradigm itself. The shift from fragmented approaches to strategically oriented risk governance models enables companies to identify sustainability-related threats at early stages, improve the accuracy of scenario analysis, and adapt their business models to evolving external conditions. The practices of leading corporations such as Microsoft, Coca-Cola, and ExxonMobil demonstrate that ESG metrics are already becoming integral components of ERM systems – reflecting not only regulatory compliance but also a company's capacity to ensure long-term resilience, investment attractiveness, and stakeholder trust. Effective implementation of ESG-oriented tools requires a robust data architecture, independent assurance of non-financial disclosures, and alignment between risk management, corporate strategy, and executive incentive structures.

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