Unveiled by Deep Learning: The Environmental, Social, and Governance Emphasis of Leading Companies in East Asia and Southeast Asia

Investors are increasingly looking at available information on environmental sustainability, social responsibility, and governance quality for guidance to evaluate corporate performances. Environmental, social, and governance (ESG) factors have become critical components of corporate strategy and reporting. Yet, understanding the emphasis that different companies place on these topics—especially across multilingual, multicultural environments—remains limited.

According to the European Commission (2022), while many market participants use ESG ratings, they also believe that the ESG ratings market does not function well. They consider the lack of transparency and presence of bias in ratings methodologies to be problematic, which leads to low correlation among various ESG ratings.

An Asian Development Bank working paper by Li et al. (forthcoming) investigates how the largest companies in eight East Asian and Southeast Asian economies address ESG issues in their corporate reports. The study addresses the gap in ESG reporting by analyzing large-scale unstructured text data using advanced natural language processing tools and artificial intelligence (AI).

Utilizing a sophisticated AI and deep learning model—the Text Match Pre-Trained Transformer (TMPT)—the authors analyze 480 annual and integrated reports from 293 listed companies with the largest market capitalizations in the stock markets of the People's Republic of China (PRC), Japan, the Republic of Korea, Indonesia, Malaysia, the Philippines, Singapore, and Thailand. The 2023 annual reports (published in 2024) were gathered in both English and the respective local language when available. Thirteen ESG-related topics were examined, including human rights, work environment, governance risk, and greenhouse gas emissions. This enabled a detailed examination of ESG disclosure patterns and regional variation.

The TMPT was trained using huge amounts of text from Wikipedia and academic research in multiple languages. This advanced AI model works by comparing company reports with a list of 13 ESG topics—like climate change, human rights, and job creation—to see how closely the company's words match each topic. Every report was broken into small sections, and the model checked how much each section discussed these issues. It then gave every company a score showing how much it focused on each ESG topic. The TMPT model offers a scalable, multilingual approach for detecting ESG content without relying on predefined taxonomies, enabling more consistent comparisons across linguistic and national contexts. Importantly, the study finds substantial differences in ESG emphasis among economies, shaped by their unique regulatory environments, cultural contexts, and economic conditions.

This powerful AI tool—with over 519 million adjustable settings—performed very well, correctly identifying ESG content about 90% of the time. It worked best in languages where more training data were available such as English, Chinese, and Japanese.

The paper builds on prior work by Yoshida et al. (2024), who questioned the consistency and reliability of conventional ESG ratings. In contrast, the approach of Li et al. (forthcoming) enables a nuanced assessment of ESG-related discourse without imposing a rigid, one-size-fits-all scoring system. Another key contribution of this study is its analysis of language-based disclosure differences. Reports written in Japanese, Chinese, and Korean show strong alignment with their English counterparts, whereas discrepancies are more pronounced in Thai and Bahasa Indonesia, pointing to possible challenges in ESG-related vocabulary and reporting standards.

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Li et al. (forthcoming) find that top companies in the Republic of Korea place greater emphasis on environmental and social topics, while leading companies in the PRC focus more on economic dimensions. Top Japanese firms balance various ESG topics, notably emphasizing work environment and domestic job creation. Meanwhile, leading companies in Indonesia, Malaysia, and the Philippines give relatively more attention to community-related and human rights issues.

Key Findings

Overall Environmental, Social, and Governance Emphasis Patterns

Across all reviewed reports, companies emphasized economic and governance topics—particularly economic ripple effects, production costs, and governance risks—more than social or environmental ones. Social topics like domestic job creation and work environment were also notable. Environmental topics such as mining, consumption, and greenhouse gases received moderate attention (**Figure 16**).

People's Republic of China. Reports in the PRC had a strong focus on economic topics (e.g., ripple effects, production costs). This aligns with the PRC's focus on post-COVID-19 economic recovery in 2023.

Republic of Korea. Reports from the Republic of Korea placed the most emphasis on environmental and social topics, such as work environment and greenhouse gas emissions, although there was large intra-market variance.

Japan. Japanese reports reflected a balanced focus, with the most emphasis on social aspects like job creation and work environment.

Indonesia, Malaysia, and the Philippines. Among these three economies, reports generally gave greater emphasis to community-related issues and human rights. Malaysia notably emphasized governance risk, while the Philippines focused more on water management.

Singapore. The focus of annual reports in Singapore leaned toward economic topics, particularly job creation.

Thailand. Reports in Thailand showed a relatively balanced profile that was close to the regional average on most topics.

Intra-Market Variance

While market-level trends are identifiable, significant variation within economies was also observed. For example, Korean companies differed greatly in how much they emphasize environmental and social issues—some heavily emphasize them, while others focus primarily on economic topics.

Language Consistency

Out of 163 companies with bilingual reports, a high degree of consistency was found in the PRC, Japan, and the Republic of Korea, indicating effective translation and standardization of ESG messaging (**Figure 17**). Reports from Thailand and Indonesia exhibited inconsistencies between their English and local language versions, possibly due to translation practices or a lack of ESG literacy in local languages. This discrepancy might also stem from the scarcity of ESG-related content in these languages, limiting the enforced training of the TMPT model.

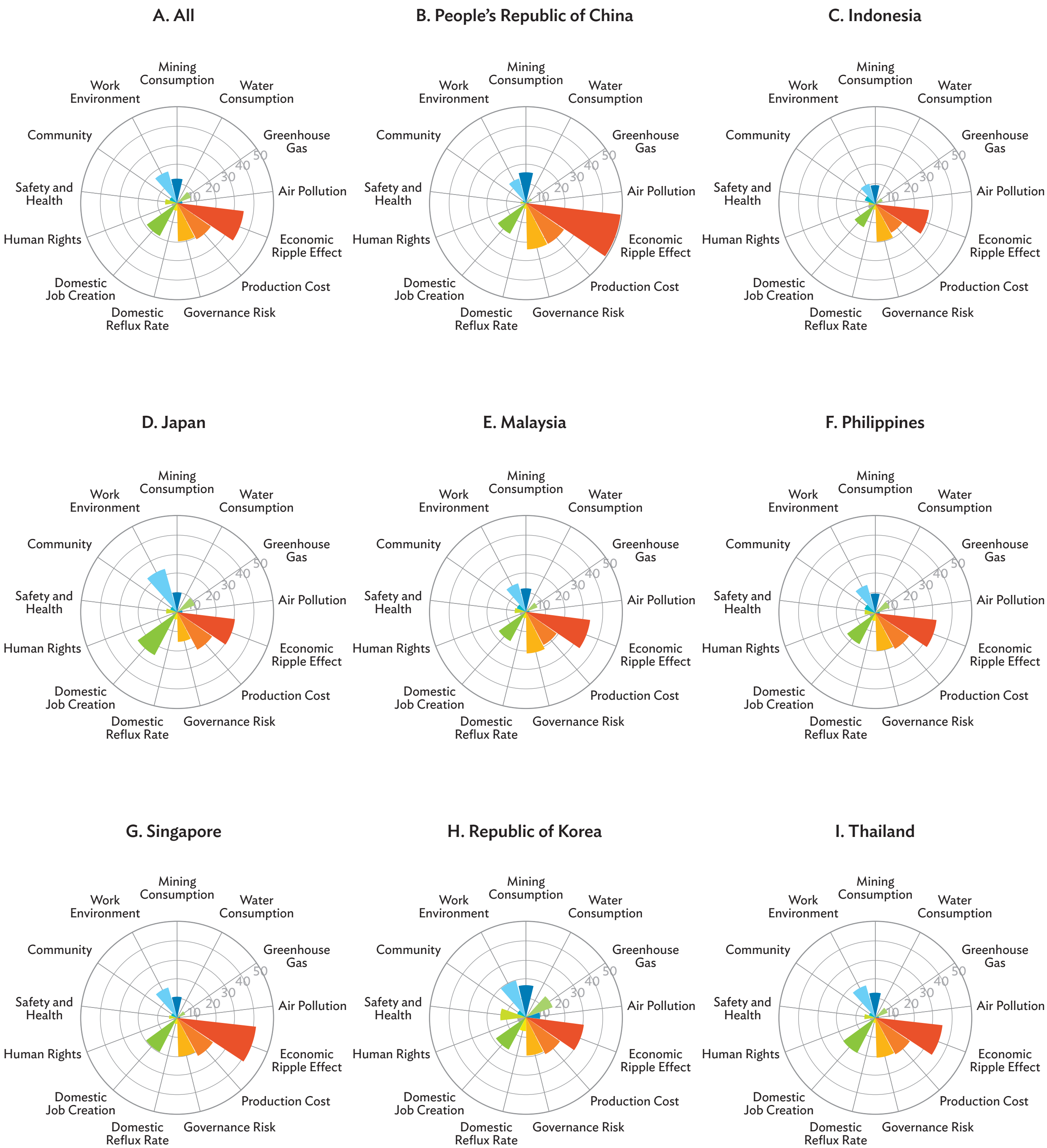
Policy Implications

This study demonstrates the utility of AI in understanding nuanced ESG reporting patterns across languages and economies. It also underscores the influence of national priorities, regulatory environments, and cultural factors on ESG disclosures.

For instance, the emphasis of firms in the PRC on economic factors reflects the government's push for economic stability. Meanwhile, Korean firms' engagement with social and environmental themes reflects both societal pressure and the influence of large conglomerates. In contrast, community-related disclosures in Southeast Asia may reflect local development challenges.

The analysis also points to a broader concern: Disparities in ESG understanding and communication across economies may be exacerbated by the limitations of AI models trained on linguistically unequal data. This indicates a need for capacity building in ESG education and data availability in underrepresented languages.

Figure 16: Average Absolute Environmental, Social, and Governance Emphasis in Annual Corporate Reporting Among Selected East Asian and Southeast Asian Economies (%)



Source: Author's calculations.

Figure 17: Correlation Results of the Language Consistency Analysis

Item	People's Republic of China	Indonesia	Japan	Republic of Korea	Thailand
Air Pollution	0.63	0.97	0.57	0.44	−0.06
Greenhouse Gas	0.47	0.94	0.85	0.42	−0.18
Water Consumption	0.49	1.00	0.42	0.31	−0.21
Mining Consumption	0.66	0.85	0.60	0.22	0.12
Work Environment	0.38	0.80	0.33	0.23	0.17
Community	0.19	0.95	0.29	0.58	0.44
Safety and Health	0.31	0.81	0.63	0.72	0.62
Human Rights	0.25	0.31	0.17	0.32	0.40
Domestic Job Creation	0.22	−0.33	0.20	0.12	0.11
Domestic Reflux Rate	0.16	−0.60	0.21	0.23	0.22
Governance Risk	0.45	−0.19	0.02	0.42	−0.33
Production Cost	0.57	0.95	0.25	0.52	0.17
Economic Ripple Effect	0.59	−0.64	0.51	0.82	−0.22

1.00 | 0.75 | 0.50 | 0.25 | 0.00 | −0.25 | −0.50 | −0.75 | −1.00

Source: Author's calculations.

Overall, the study illustrates the impact of AI in improving the transparency, comparability, and contextual understanding of ESG disclosures, providing a valuable alternative to traditional single-scale evaluations. Meanwhile, stakeholder engagement through improved disclosure is fundamental for understanding companies' commitment to ESG issues. The number of integrated reports published is increasing; however, not all leading companies included in this study have issued one. Integrated reporting can enhance transparency and strengthen stakeholder engagement. Nevertheless, a key limitation is the lack of standardization and comparability across reports. This study addresses that limitation and enhances the practical value of integrated reports with narratives that explain corporate strategy. To further improve transparency and corporate governance, regulators and companies should adopt diverse communication tools, including integrated reports, and promote timely disclosure practices. The publication of integrated reports and translation to English is often seen as a challenge to small and medium-sized companies due to the costs involved. However, regardless of the form of disclosure and communication, advanced technology can provide ways to assess companies' business strategies alongside stakeholders' various environmental and social interests.

References

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