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EXPLORING LANGUAGE USE IN ITALIAN SUSTAINABILITY REPORTING: A CLUSTER ANALYSIS

The company's sustainability reporting language reflects its priorities, strategies, and alignment with Sustainable Development Goals within sustainability-focused corporate governance. Italian firms, noted for their dedication to sustainability, employ diverse linguistic strategies in their sustainability reports (SRs) to convey their environmental, social, and governance initiatives. This research utilized cluster analysis to examine the vocabulary in SRs from Italy's largest corporations, revealing patterns that indicate thematic priorities across various economic sectors. This paper analyzed language usage to elucidate how Italian firms convey sustainability strategies while addressing sector-specific challenges and goals.

This study examined sector-specific language in SRs from 203 big Italian corporations from Lab24's "Sustainability Leaders 2023" list, spanning 23 industries [1]. SRs, consolidated non-financial statements, integrated reports, and other disclosures were obtained from official websites or supplied upon request. For companies lacking separate SRs, pertinent sections were extracted from annual reports to ensure consistency. Keyword extraction with Voyant text mining identified the dominant language within each industry, thereby enabling comparisons across sectors. A hierarchical cluster analysis was performed to identify thematic similarities. After excluding low-frequency keywords and normalizing the data [2–4], a similarity matrix was constructed using Euclidean distance, and clusters were generated through Ward's linkage method to reduce within-cluster variance [5; 6].

Hierarchical clustering revealed seven distinct clusters based on SRs' sector-specific vocabulary (see Fig. 1). Below is each cluster analysis,

emphasizing the significance of the identified linguistic strategies for the respective sectors.

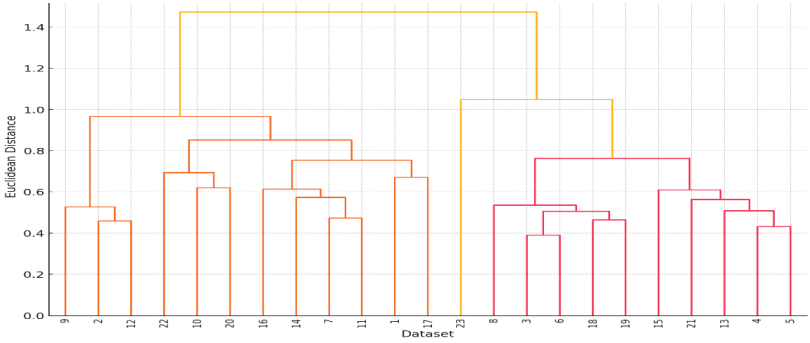

Figure 1. Dendrogram of Hierarchical Clustering

Source: research results

Cluster 1: Risk and Governance-Centered Sustainability (Banks, Insurance, Retail, Wholesale & E-commerce, Financial Services, and Asset Management). Cluster 1 is defined by a systematic and equitable approach to sustainability, emphasizing risk management, corporate governance, and environmental accountability. The recurrent use of "sustainability," "risk," and "management" highlights a focus on addressing uncertainties and integrating sustainability into organizational structures. "Employee," "financial," and "training" terms underscore the significance of workforce development and fiscal accountability. "Emissions," "green," and "energy" signify a dedication to minimizing environmental impacts and enhancing resource efficiency. The phrases "policy" and "stakeholder" focus on regulatory compliance and stakeholder involvement. At the same time, the infrequent use of terms such as "women" and "safety" implies a nascent emphasis on gender inclusion and employee safety. Cluster 1 offers a holistic strategy that harmonizes sustainability's operational, environmental, and social dimensions, customized for the distinct requirements of the financial and service-oriented sectors.

Cluster 2: Efficiency and Digital-Driven Sustainability (Technology & IT, Telecommunications, General Services, Transportation & Logistics, and Media). Cluster 2 highlights operational procedures, digital integration, and stakeholder involvement. Terms like "management," "sustainability," and "employee" highlight a systematic, human-centric methodology that incorporates sustainability into fundamental operations. The prevalence of "digital," "information," and "system" signifies the use of digital tools to improve transparency, efficiency, and data management. "Emissions," "energy," and "environment" focus on reducing ecological effects, whereas

"social" and "health" emphasize employee welfare and safety. Terms such as "customer," "supplier," and "network" exemplify robust stakeholder involvement and supply chain management. This cluster embodies a holistic strategy that integrates operational efficiency, digital transformation, and environmental stewardship, addressing the specific requirements of technology-driven industries.

Cluster 3: Resource and Environmental-Focused Sustainability (Energy, Procurement & Raw Materials, and Investment Holding). Cluster 3 emphasizes resource efficiency and environmental stewardship. Terms like "energy," "management," and "activity" underscore organized procedures and proactive involvement in sustainability initiatives. The recurrent reference to "energy" indicates a significant emphasis on sustainable energy management, while "water," "emissions," and "waste" denote initiatives aimed at reducing environmental effects. Mentions of "sustainability," "GRI," and "governance" indicate conformity with established sustainability standards, while "safety," "health," and "risk" underscore employee welfare and operational security. The terms "transition," "material," and "carbon" signify a dedication to sustainable resource transitions and carbon management appropriate for industries deeply engaged in resource acquisition and investment. Cluster 3 demonstrates a holistic sustainability strategy emphasizing resource efficiency, regulatory compliance, and environmental impact management, particularly applicable to the energy and raw material sectors.

Cluster 4: Waste and Safety-Oriented Sustainability (Waste Disposal & Recycling). Cluster 4 emphasizes environmental stewardship, waste minimization, and methodical management. The emphasis on "environment" and "waste" signifies a primary concern for reducing environmental effects and advocating for waste management strategies. "System" and "management" imply a methodical, strategic framework for integrating sustainability into operational operations. "Safety," "process," and "treatment" underscore the need for secure and effective waste management, while "employee," "supplier," and "corporate" highlight the necessity of stakeholder involvement across the supply chain. The terms "hazardous," "landfill," and "recovery" indicate initiatives aimed at the responsible management of hazardous substances and the reduction of landfill utilization. "Data," "risks," and "responsibility" terms underscore a data-centric, risk-aware methodology that fosters accountability. This cluster has a holistic strategy focused on environmental impact, waste management, and operational safety, addressing the requirements of the waste disposal and recycling industry.

Cluster 5: Material and Workforce-Integrated Sustainability (Industrial Products & Components, Fashion, Engineering & Construction, Beauty, and Automotive Supply Chain). Cluster 5 embodies a comprehensive strategy for sustainability, emphasizing environmental stewardship, resource optimization, and workforce enhancement. The recurring phrases "management,"

"sustainability," and "activity" indicate a cohesive strategy for sustainability in organizational operations. Terms like "material," "employee," and "business" underscore the significance of resource efficiency, employee involvement, and company integration in achieving sustainability objectives. "Emissions", "energy", "waste" and "water" underscore a dedication to mitigating ecological effects, whereas "safety" and "health" emphasize the welfare of employees. Terms like "development" and "training" signify ongoing endeavors to equip the workforce for sustainable practices. This cluster's language embodies a harmonious strategy that integrates environmental stewardship, supply chain responsibility, and ongoing enhancement, corresponding with the requirements of industrial and consumer-oriented industries.

Cluster 6: Product and Employee-Balanced Sustainability (Catering & Ho.Re.Ca, Chemistry, and Pharmaceuticals). Cluster 6 emphasizes harmonizing management, product accountability, environmental sustainability, and employee welfare. The terminology of "management," "sustainability," and "product" indicates a systematic method for integrating sustainable practices into product creation and corporate governance. The focus on "environment," "activity," and "material" signifies a dedication to environmental stewardship, whereas "employee," "safety," and "health" underscore the importance of workforce welfare. "Energy," "waste," and "water" indicate an emphasis on resource management, while "pharmaceutical," "patient," and "disease" imply significance to sectors affecting public health. This cluster endorses a multi-industry strategy for sustainability, especially pertinent to industries where product accountability and community engagement are essential.

Cluster 7: Product and Brand-Centric Sustainability (Finished Products & Consumer Goods, Food & Beverages, Beauty, Personal & Healthcare). Cluster 7 highlights product accountability, resource efficiency, and brand management within a sustainability paradigm. The prevalence of "sustainability," "product," and "management" highlights the incorporation of sustainable practices into product development and brand principles. "Environment," "material," and "production" signify an emphasis on minimizing ecological effects and enhancing resource efficiency, but "employee," "health," and "safety" underscore the importance of workforce welfare. The terms "packaging," "water," and "social" imply a comprehensive strategy encompassing sustainable packaging, water stewardship, and social accountability. Cluster 7 exemplifies a product-centric strategy that harmonizes environmental, social, and economic factors, addressing consumer-oriented sectors.

Summary. The findings indicate specific sustainability priorities across clusters corresponding to sectoral interests. The variation in focus, spanning risk management, digital integration, resource efficiency, waste management, and product responsibility, illustrates the differences in sustainability

terminology across sectors, mirroring distinct operational requirements and stakeholder expectations.

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