Evaluation of Innovation in Latin American Metal Mining: An Application of Fuzzy Logic

Luis Mendiola
Universidad ESAN
Finance & Accounting
Lima 150140
lmendiola@esan.edu.pe

Abstract. *In corporate governance, board composition and diversity significantly impact innovation and financial performance. This study proposes a fuzzy system to evaluate the value added by board diversity in the Latin American metal mining sector. The system offers an alternative approach to measuring innovativeness, moving away from surveys and financial proxies. Instead, it focuses on structured observation of board characteristics, such as age, female representation, foreign directors, industry experience, board size, independence, and ownership structure.*

By systematically assessing the relationship between board diversity and innovation, this study contributes to corporate governance in the mining industry. It provides key stakeholders with a quantitative tool to inform board composition decisions and promote diversity as a driver of innovation and business success. The study analyzed 12 companies in Peru, Chile, and Colombia, highlighting limited female representation on metal mining boards. The results indicate a positive influence from ownership and board structure, as well as partial effects from board diversity.

This research sheds light on the crucial role of board diversity in fostering innovation and financial performance. It underscores the need for increased efforts to enhance diversity and inclusion within the metal mining sector. By adopting the proposed fuzzy system, companies can evaluate and enhance the composition of their boards to leverage the benefits of diverse perspectives and experiences. Ultimately, this study provides insights that can empower mining industry stakeholders to embrace diversity as a driver of innovation and sustainable growth.

Keywords. Corporate governance, Innovation, Board diversity, fuzzy logic.

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References

Aghajani Bazzazi, A., Osanloo, M., & Karimi, B. (2011). A new fuzzy multi criteria decision making model for open pit mines equipment selection. Asia-Pacific *Journal of Operational Research*, 28(03), 279–300.

Chin, C. L., Chen, Y. J., Kleinman, G., & Lee, P. (2009). Corporate ownership structure and innovation: Evidence from Taiwan's electronics industry. *Journal of Accounting, Auditing & Finance*, 24(1), 145–175.

Crespo, N. F., & Crespo, C. F. (2016). Global innovation index: Moving beyond the absolute value of ranking with a fuzzy-set analysis. *Journal of Business Research*, 69(11), 5265–5271.

Jefferson, G. H., Huamao, B., Xiaojing, G., & Xiaoyun, Y. (2006). R&D performance in Chinese industry. *Economics of Innovation and New Technology*, 15(4–5), 345–366.

Ferreira MA and Matos P (2008) The colors of investors' money: the role of institutional investors around theworld. *Journal of Financial Economics* 88(3): 499–533.

Gillan SL and Starks LT (2003) Corporate governance, corporate ownership and the role of institutional investors: a global perspective. *Journal of Applied Finance* 13(2): 4–22.

Graves, S. B. (1990). Institutional ownership and corporate R&D investment. *Technological Forecasting and Social Change*, 37(1), 59–76.

Matzler, K., Veider, V., Hautz, J., & Stadler, C. (2015). The impact of family ownership, management, and governance on innovation. *Journal of Product Innovation Management*, 32, 319–333. https://doi.org/10.1111/jpim.12202

Ruiqi, W., Wang, F., Xu, L., & Yuan, C. (2017). R&D expenditures, ultimate ownership and future performance: Evidence from China. *Journal of Business Research*, 71, 47–54