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"Driving Economic Sustainability through Circular Economy and Open Innovation: A Multigroup Analysis of Mexican manufacturing SMEs considering Quality and Environmental Management Systems"

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Introduction

SMEs in emerging economies, have limited financial and managerial resources and a lack of time and skills(López-Pérez et al., 2017). There are economic and technical resources lacking for the implementation of strategies such as the circular economy or innovation.(Scipioni et al., 2021).The use of OI within CE is still a recent phenomenon, emphasizing collaboration between stakeholders and the co-creation approach (Jesus & Jugend, 2023).

Environmentally Adjusted GDP represented on average 75.7% of the country's GDP in 2020. The manufacturing industry generates the highest impact, accounting for 15% of the total generated (INEGI, 2022). Mexico had a total cost of environmental depletion equivalent to 4.6% of the national GDP at the end of 2020. Despite the approval of the Circular Economy Act in 2021, there has been no execution instrument as of the first half of 2022 (Mexican Senate, 2022).

This paper analyzes the impact of the Circular Economy (CE) and Open Innovation (OI), on the Economic Sustainability (ES) of the manufacturing SMEs in Mexico, drawing on the Resource Based View, and Natural Resource Based View Theory

Multi-group Analysis differences

Certified SMEs versus Non-certified SMEs			
	Difference	2 tails (p value)	Supported
CE-ES	0.351	0.014	Yes
OI-CE	0.099	0.253	No
OI-ES	-0.106	0.446	No

Results

The findings reveal a positive and significant impact of CE and OI on ES and a positive and significant impact of the OI on CE.

Additionally, CE's mediating role is confirmed, and significant differences are identified in the effect of the CE on the ES of the SMEs with Quality Management (QM) or Environmental Management (EM), versus those without.

Method

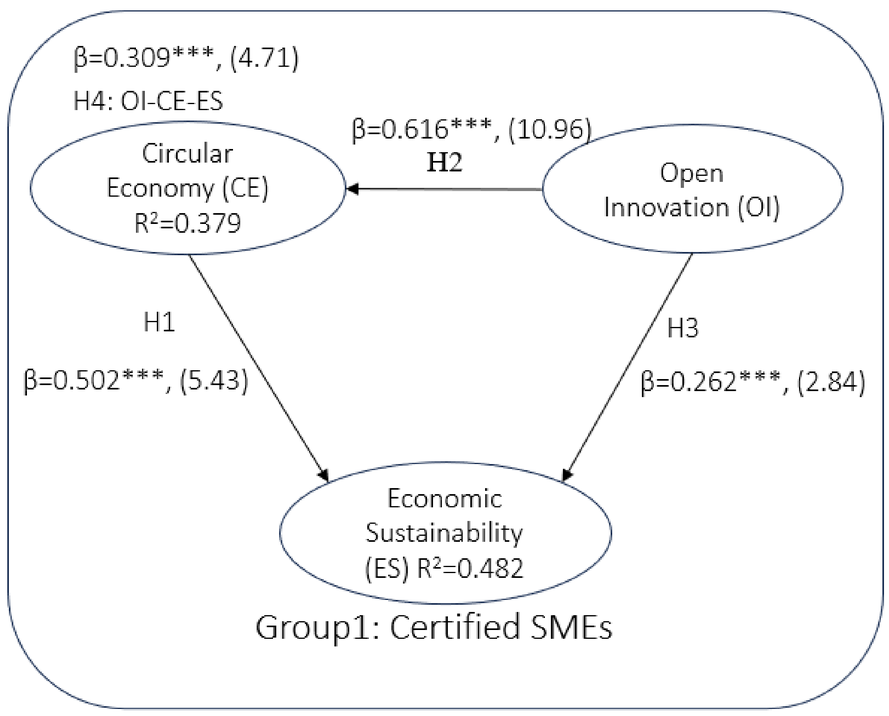
Sample: A finite population stratified sampling approach was used for sample selection, including the automotive, aerospace, metal-mechanic, chemical, and textile subsectors, resulting in a total of 234 companies from all country.

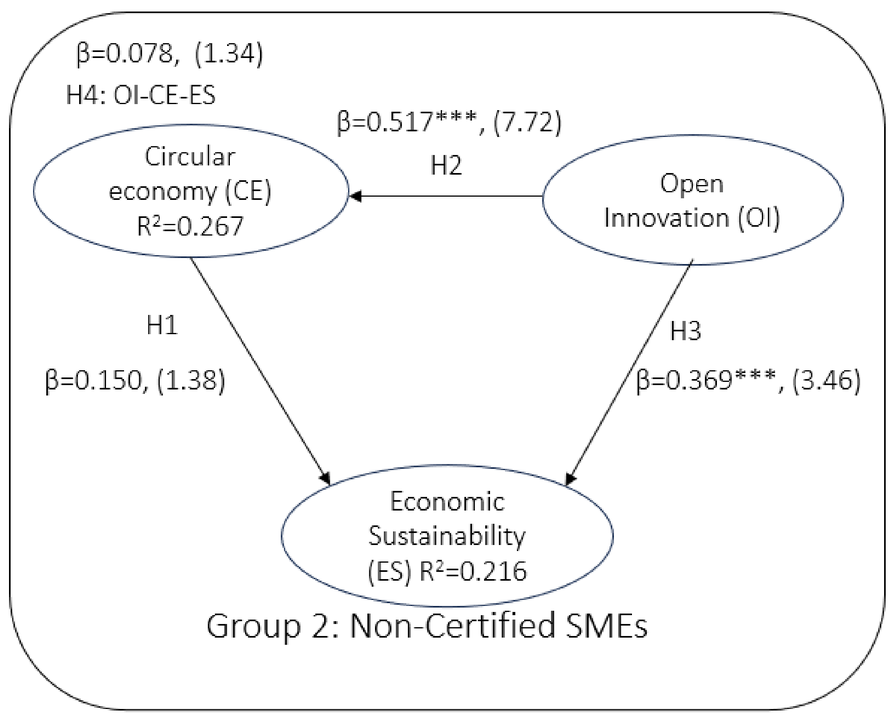
Instrument: The survey included questions related to the adoption and implementation of CE and OI principles, as well as questions regarding ES practices, through Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

- PLS-SEM, MICOM and Multi-group Analysis.

Reliability and validity

Construct	Group			
	Complete (n=234)			
	Cronbach's Alpha	Dijkstra–Henseler's ρ_A	Composite reliability ρ_c	AVE
ES	0.837	0.827	0.842	0.550
CE	0.819	0.915	0.827	0.480
OI	0.904	0.842	0.915	0.676
	Certified SMEs (n=110)			
	Cronbach's Alpha	Dijkstra–Henseler's ρ_A	Composite reliability ρ_c	AVE
ES	0.824	0.863	0.829	0.532
CE	0.859	0.946	0.863	0.543
OI	0.933	0.829	0.946	0.749
	Non-certified SMEs (n=124)			
	Cronbach's Alpha	Dijkstra–Henseler's ρ_A	Composite reliability ρ_c	AVE
ES	0.841	0.784	0.843	0.555
CE	0.762	0.876	0.784	0.413
OI	0.864	0.843	0.876	0.597





The significance of the coefficients shows a positive relationship in all relationships in the certified SMEs. However, the relationship between CE and Es is not significative in the case of Non-certified SMEs.

The greater the implementation of OI practices, the greater the result in ES and CE. Regarding the relationship between OI and ES, the more networking, patent acquisition, and knowledge-based business initiation, the greater the cost reduction due to energy and material savings, as well as the reduction of costs resulting from pollution and savings from compliance with environmental laws.

Conclusions

H5: Certified SMEs ≠ Non-Certified SMEs

QMS and EMS in Mexican manufacturing SMEs are important tools to develop sustainability and improve ES, as noted by Mellat-Parast et al. (2006). Certified SMEs are more likely to purchase research and development (R&D) services from other organizations like universities, public research bodies, or suppliers. In contrast, non-certified SMEs tend to participate in collaborations with other companies to access knowledge and synergies. SMEs who applied QMS or EMS are committed to achieving their goals trough a comprehensive approach (Von Ahsen, 2014) These results support the argument made by Paluš et al., (2018) that the certification and expected benefits of MSS also focus on ES. Since there is not much literature on the specific effects of QMS and EMS in Mexican manufacturing SMEs.

References