



DETERMINANTES DE LA INNOVACIÓN ABIERTA EN EMPRESAS DEL SECTOR CARBONÍFERO DEL DEPARTAMENTO DE NORTE DE SANTANDER, COLOMBIA

Determinants of open innovation in companies in the coal sector of Norte de Santander State, Colombia

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RESUMEN

Este proyecto analiza los factores que influyen en el desarrollo de los procesos de innovación abierta en pequeñas y medianas empresas (pymes). Se propone una encuesta, utilizando ítems validados y respaldados por la literatura, para recopilar datos y analizarlos mediante modelamiento de ecuaciones estructurales. A partir de la revisión bibliográfica, se identifican varios factores que pueden influir en los procesos de apertura empresarial y se examina su efecto en la adopción de estrategias de innovación bajo un enfoque abierto por parte de las pymes del sector carbonífero del departamento de Norte de Santander. Los resultados indican que la formalización de las prácticas organizacionales tiene el mayor impacto en la mejora de los procesos de innovación. También se resalta la importancia de la conformación del equipo directivo, particularmente en términos de diversidad y coordinación. En menor medida, la experiencia de los recursos humanos también contribuye a los resultados de la innovación. En conjunto, estos cuatro determinantes explican el 65,2 % de la innovación abierta. Asimismo, en el modelo propuesto, la innovación abierta representa el 81 % del desempeño organizacional de las pymes del sector carbonífero. Esta investigación aporta al conocimiento sobre los determinantes de la innovación abierta en contextos con baja intensidad en I+D y proporciona recomendaciones generales para el diseño de estrategias orientadas a fortalecer la competitividad de las organizaciones empresariales.

PALABRAS CLAVE: carbón, determinante, efecto, empresa, innovación abierta.

ABSTRACT

This project analyzes the factors that influence the development of open innovation processes in small and medium-sized enterprises (SMEs). A survey is proposed, using validated items supported by the literature, to collect data and analyze it through structural equation modeling. Based on the bibliographic review, several factors that may influence business opening processes are identified, and their effect on the adoption of innovation strategies under an open approach by SMEs in the coal sector of the Norte de Santander department is examined. The results indicate that the formalization of organizational practices has the greatest impact on improving innovation processes. Attention is also drawn to the importance of

management team formation, particularly in terms of diversity and coordination. To a lesser extent, the experience of human resources also contributes to innovation outcomes. Altogether, these four determinants explain 65.2% of open innovation. Furthermore, in the proposed model, open innovation accounts for 81% of the organizational performance of SMEs in the coal sector. This research advances knowledge about the determinants of open innovation in contexts with low R&D intensity and provides general recommendations for the design of strategies aimed at enhancing the competitiveness of business organizations.

KEYWORDS: coal, determinant, effect, enterprise, open innovation.

INTRODUCCIÓN

Innovation has been recognized as a key factor for the competitive development of companies. As a result of innovation processes, companies develop new or improved products (goods or services), new production processes, new marketing techniques and even new management and organizational development strategies. All these elements help the company to differentiate itself, access new markets and, in general, increase its levels of competitiveness. Michael Porter (1991) in his book “The Competitive Advantages of Nations”, states that companies create competitive advantage by discovering new and better ways to compete in the global market, which in final reflections is nothing other than the act of make innovation and see it reflected in business competitiveness.

DESARROLLO TEMÁTICO

The initial model is represented in Figure 1. After analyzing and adjusting the measurement model—by removing items that did not meet the required significance indicators—it became evident that the effects of human resource training (TRAINING construct) and social integration mechanisms (MECHANISM construct) were not significant compared to the other variables. Among the human resources constructs, the one with the strongest effect on open innovation was identified, while the Training construct presented an impact coefficient of only 0.036.

Considering this result, the Training construct was removed. This adjustment did not generate significant changes in the percentage of explained innovation (R^2 = Pearson correlation coefficient), and the model effects showed slight improvements.

When analyzing the constructs related to organizational management practices, it was found that formalization had the strongest influence on open innovation. In contrast, the social integration mechanisms construct showed a very low coefficient according to the reviewed literature. Consequently, the Mechanisms construct was also removed, and this modification did not significantly affect the percentage of explained open innovation.

CONCLUSIONES

The main purpose of this research was to examine how the identified determinants relate to open innovation processes in SMEs in the coal sector of the Norte de Santander department, Colombia. The findings suggest that the diversity and coordination of the management team have a direct relationship with the generation of open innovation processes, as also proposed by Ramos et al. (2018), who conducted their study in the same economic sector.

With respect to human resources, the construct with the greatest effect on open innovation is associated with the experience of human talent. This factor is particularly relevant because, as staff gain experience, they contribute more knowledge and expertise to the organization, thereby facilitating the development of new products or services.

Regarding the construct of formalization of organizational practices, Gangi and Wasko (2009) emphasized that this dimension is consistent with the nature of an independent innovation process under an open approach, as it requires systematic and organized procedures. In line with this, the results of the present study show that formalization has a partially direct impact on open innovation, surpassing the influence of social integration mechanisms within organizational practices (Bosch, Volberda, & Boer, 1999).



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