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INFORMATION PAGE ON NEW ACADEMIC AND THEORETICAL CONTRIBUTIONS OF THE DISSERTATION

Dissertation Title: Factors Influencing Industry 4.0 Adoption in Small and Medium-Sized Enterprises in Ho Chi Minh City: An Integration of TOE-DOI Framework.

Major: Business Administration **Code:** 9340101

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New contributions in terms of theory and practice of the thesis:

1. Summary of doctoral thesis

This research aims to investigate and identify the factors influencing the adoption of Industry 4.0 by small and medium-sized enterprises (SMEs) in Ho Chi Minh City. The author constructs the research model based on the foundational theories of TOE (Technology-Organization-Environment) and DOI (Diffusion of Innovations). The research methodology used includes both qualitative and quantitative methods. Qualitative data was collected through discussions with 7 experts and focus group discussions with 9 business managers, while quantitative data was collected through surveys of 353 SMEs in Ho Chi Minh City. The author uses the partial least squares estimation method to process and analyze the data.

The results of measurement model assessment validation indicate that technological readiness, organizational readiness, and environmental readiness are second-order constructs. Technological readiness is composed of relative advantages, compatibility, trialability, and perceived security. Organizational readiness includes top management support, absorptive capacity, financial resources, and IT infrastructure. Environmental readiness consists of government support, competitive pressure, and external support.

Results from the structural model demonstrate that technological, organizational, and environmental readiness positively influence both Industry 4.0 readiness and attitudes toward adoption, which in turn application of Industry 4.0 among SMEs. Additionally, leadership characteristics play a moderating role in strengthening the relationships between Industry 4.0 readiness and the adoption of Industry 4.0, as well as between attitudes toward Industry 4.0 adoption and the actual adoption of Industry 4.0. The research results are the basis for proposing managerial implications, helping business managers develop solutions to implement the scientific and technological achievements of Industry 4.0, with the aim of enhancing efficiency in production and business operations.

2. Theoretical contributions

This research makes a significant academic contribution by extending and advancing theoretical models on Industry 4.0 adoption at the organizational level, particularly in the context of small and medium-sized enterprises (SMEs) in emerging economies. Building upon the integration of the Technology – Organization - Environment framework (TOE) and the Diffusion of Innovation theory (DOI), the research develops a comprehensive conceptual model aimed at explaining the factors influencing Industry 4.0 adoption in SMEs. This integrative approach not only builds upon prior studies but also addresses the limitations of single - theory models, which often examine technological, organizational, or environmental factors in isolation.

A key theoretical contribution of the research lies in the construction and validation of second-order multidimensional structures for the constructs of technological readiness, organizational readiness, and environmental readiness within the Industry 4.0 context. The validation of these structures contributes to the refinement of measurement scales, enabling a more precise assessment of Industry 4.0 readiness, and thus providing

a solid scientific foundation for subsequent research in technology adoption and implementation. The findings not only clarify the multidimensional nature of the readiness concept but also contribute to the standardization of measurement scales for SMEs.

Furthermore, the study elucidates the mechanisms through which technological readiness, organizational readiness, and environmental readiness influence Industry 4.0 adoption via mediating factors such as readiness level and attitudes toward Industry 4.0 applications. This approach enhances the explanatory power of the research model while providing empirical evidence for studies on organizational-level technology adoption behavior. Notably, the identification of the moderating role of leadership characteristics (CEO) in the relationship between readiness levels and Industry 4.0 adoption adds a managerial and leadership perspective to the theoretical framework, thereby enriching research on leadership in the context of digital transformation and Industry 4.0.

Finally, the research model serves as a foundation for future studies exploring topics such as the impact of Industry 4.0 on various sectors and industries. The study's findings can support the development of scientific and technological innovations that align with economic development trends and are acceptable to both markets and enterprises.

3. Practical contributions

From a practical perspective, the study's findings provide scientific evidence that assists managers of Small and medium-sized enterprises (SMEs) in systematically identifying the key factors influencing Industry 4.0 adoption. Through the research model and empirical validation results, enterprises can comprehensively assess their readiness across technological, organizational, and environmental dimensions, thereby developing strategies and roadmaps for Industry 4.0 adoption that align with their internal capabilities and specific business contexts.

The study indicates that effective Industry 4.0 adoption depends not only on the new technological values and benefits but also requires coordinated preparation in financial resources, absorptive capacity, support from top leadership, information technology infrastructure, and the ability to leverage external environmental factors. Based on these insights, managers can make informed investment and implementation decisions,

mitigate risks during the transformation process, and enhance the likelihood of successfully adopting Industry 4.0 solutions.

For policymakers, the study provides valuable empirical evidence to support the design and adjustment of policies that promote Industry 4.0 adoption within the SME sector. The findings suggest that support policies should be designed in a comprehensive and integrated manner, combining financial incentives, IT infrastructure development, workforce training, and enhancement of enterprise management capabilities. Additionally, the study serves as a useful reference for consulting organizations and technology solution providers in developing and implementing Industry 4.0 products and services that match the needs and absorptive capacity of SMEs.

The study's results clarify the actual factors affecting Industry 4.0 adoption in SMEs in Ho Chi Minh City, addressing the question: why do SMEs remain passive in the face of Industry 4.0 development? Consequently, the findings offer managerial implications that can help SMEs actively engage in Industry 4.0 adoption.

PhD Candidate

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