

Các yếu tố thúc đẩy việc thực hiện cách mạng công nghiệp 4.0 của các doanh nghiệp nhỏ và vừa tại Việt Nam

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Tóm tắt: Mặc dù các nghiên cứu về cách mạng công nghiệp 4.0 (CMCN 4.0) đã khẳng định các lợi ích mang lại cho các doanh nghiệp, song việc thực hiện thành công không dễ dàng, đặc biệt với các doanh nghiệp nhỏ và vừa (DNNVV). Nghiên cứu này nhằm xác định các yếu tố thúc đẩy việc thực hiện CMCN 4.0 tại các DNNVV ở Việt Nam. Bằng cách sử dụng mô hình cấu trúc tuyến tính (SEM) với mẫu 170 DNNVV tại Việt Nam, kết quả nghiên cứu cho thấy, chiến lược, hoạt động, cũng như các cơ hội môi trường và xã hội là động lực tích cực của việc thực hiện CMCN 4.0, trong khi những thách thức liên quan đến khả năng cạnh tranh và khả năng tồn tại trong tương lai cũng như sự phù hợp về tổ chức và sản xuất cản trở tiến trình thực hiện. Hơn nữa, kết quả nghiên cứu cũng chỉ ra rằng, nhận thức về các cơ hội và thách thức liên quan đến CMCN 4.0 như tiền đề cho việc thực hiện CMCN 4.0 phụ thuộc vào các đặc điểm khác nhau của doanh nghiệp. Trên cơ sở kết quả nghiên cứu, tác giả đưa ra các hàm ý chính sách cho các nhà hoạch định, quản lý doanh nghiệp nhằm thúc đẩy việc thực hiện cuộc CMCN 4.0.

Từ khóa: Cách mạng công nghiệp 4.0, doanh nghiệp nhỏ và vừa, mô hình cấu trúc tuyến tính (SEM).

Mã phân loại JEL: O33.

Tài liệu tham khảo

- Anderson, J. C. & Gerbing, D. W. (1984). The effect of sampling error on convergence, improper solutions, and goodness-of-fit indices for maximum likelihood confirmatory factor analysis. *Psychometrika*, 49(2), 155–173. <https://doi.org/10.1007/bf02294170>
- Arnold, C., Kiel, D. & Voigt, K.-I. (2016). How the Industrial Internet of Things changes business models in different manufacturing industries. *International Journal of Innovation Management*, 20(08), 1640015. <https://doi.org/10.1142/s1363919616400156>.
- Arnold, C., Kiel, D. & Voigt, K.-I. (2017). The Driving Role of the Industrial Internet of Things for Strategic Change: The Case of Electronic Engineering Business Models. *International Journal of Engineering*, 14(2), 13–19.
- Bauer, W., Hämmelerle, M., Schlund, S. & Vocke, C. (2015). Transforming to a Hyper-connected Society and Economy Towards an Industry 4.0. *Procedia Manufacturing*, 3, 417–424.
- Berman, B. (2013). 3D printing: the new industrial revolution. *Engineering Management Review*, 41(4), 72–80. <https://doi.org/10.1109/emr.2013.6693869>.
- Bollen, K. A. (1989). *Structural Equations with Latent Variables*. John Wiley & Sons, Inc. <https://doi.org/10.1002/9781118619179>
- Bonekamp, L. & Sure, M. (2015). Consequences of Industry 4.0 on Human Labour and Work Organisation.
- Brettel, M., Friederichsen, N., Keller, M. & Rosenberg, N. (2014). How virtualization, decentralization and network building change the manufacturing landscape: An Industry 4.0 Perspective. *International Journal of Science, Engineering and Technology*, 8, 37–44.
- Burmeister, C., Luetgens, D. & Piller, F. T. (2015). Business Model Innovation for Industrie 4.0: Why the Industrial Internet Mandates a New Perspective. *Electronic Journal*. <https://doi.org/10.2139/ssrn.2571033>
- Dombrowski, U. & Wagner, T. (2014). Mental Strain as Field of Action in the 4th Industrial Revolution. *Procedia {CIRP}*, 17, 100–105. <https://doi.org/10.1016/j.procir.2014.01.077>
- Dregger, J., Niehaus, J., Ittermann, P., Hirsch-Kreinsen, H. & ten Hompel, M. (2016). The digitization of manufacturing and its societal challenges: a framework for the future of industrial labor. In *2016 International Symposium on Ethics in Engineering, Science and Technology*. IEEE. <https://doi.org/10.1109/ethics.2016.7560045>
- Erol, S., Jäger, A., Hold, P., Ott, K. & Sihn, W. (2016). Tangible Industry 4.0: A Scenario-Based

- Approach to Learning for the Future of Production. *Procedia {CIRP}*, 54, 13–18. <https://doi.org/10.1016/j.procir.2016.03.162>
- Gabriel, M. . & Pessel, E. (2016). Industry 4.0 and sustainability impacts: Critical discussion of sustainability aspects with a special focus on future of work and ecological consequences. *International Journal of Engineering*, 14(2), 131–136.
- Gawer, A. & Cusumano, M. (2013). *Platforms and Innovation*. Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199694945.013.014>
- Gilchrist, A. (2016). *Industry 4.0: The Industrial Internet of Things*. Apress, Berkeley, CA. <https://doi.org/https://doi.org/10.1007/978-1-4842-2047-4>
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E. &, & Tatham, R. L. (2006). *Multivariate data analysis* (6th ed.). Pearson University Press.
- Herrmann, C., Schmidt, C., Kurle, D., Blume, S. & Thiede, S. (2014). Sustainability in manufacturing and factories of the future. *International Journal of Precision Engineering and Manufacturing-Green Technology*, 1(4), 283–292. <https://doi.org/10.1007/s40684-014-0034-z>
- Hirsch-Kreinsen, H. (2014). Smart production systems: a new type of industrial process innovation
Smart production systems: a new type of industrial process innovation.
- Kagermann, H., Wahlster, W. & Helbig, J. (2013). *Recommendations for Implementing the Strategic Initiative Industrie 4.0 - Securing the Future of German Manufacturing Industry*. München. Retrieved from http://forschungsunion.de/pdf/industrie_4_0_final_report.pdf
- Kiel, D.; Müller, J.; Arnold, C.; Voigt, K.-I (2017). Sustainable Industrial Value Creation: Benefits and Challenges of Industry 4.0. *Int. J. Innov. Manag.* 2017, 21, 1740015
- Kortmann, S. & Piller, F. (2016). Open Business Models and Closed-Loop Value Chains: Redefining the Firm-Consumer Relationship. *California Management Review*, 58(3), 88–108. <https://doi.org/10.1525/cmr.2016.58.3.88>.
- Laudien, S.M.; Spieth, P.; Clauß (2017), T. Digitalization as Driver of Business Model Innovation: An Exploratory Analysis. In Proceedings of the 28th *International Society for Professional Innovation Management (ISPIIM) Conference*, Vienna, Austria, 18–21 June 2017.
- Lee, J., Kao, H.-A. & Yang, S. (2014). Service Innovation and Smart Analytics for Industry 4.0 and Big Data Environment. *Procedia*, 16, 3–8. <https://doi.org/10.1016/j.procir.2014.02.001>
- Lin, K., Shyu, J. & Ding, K. (2017). A Cross-Strait Comparison of Innovation Policy under Industry 4.0 and Sustainability Development Transition. *Sustainability*, 9(5), 786. <https://doi.org/10.3390/su9050786>.
- Malesky, E. (2018). Researching Vietnamese Politics. *Journal of Vietnamese Studies*, 13(3), 127–162. <https://doi.org/10.1525/vs.2018.13.3.127>.
- Meyer, B., Meyer, M. & Distelkamp, M. (2011). Modeling green growth and resource efficiency: new results. *Mineral Economics*, 24(2–3), 145–154. <https://doi.org/10.1007/s13563-011-0008-3>.
- Müller, J. M., Kiel, D. & Voigt, K.-I. (2018). What Drives the Implementation of Industry 4.0? The Role of Opportunities and Challenges in the Context of Sustainability. *Sustainability*, 10(1), 247. <https://doi.org/10.3390/su10010247>.
- Oettmeier, K. & Hofmann, E. (2016). Additive manufacturing technology adoption: an empirical analysis of general and supply chain-related determinants. *Journal of Business Economics*, 87(1), 97–124. <https://doi.org/10.1007/s11573-016-0806-8>.
- Peukert, B., Benecke, S., Clavell, J., Neugebauer, S., Nissen, N. F., Uhlmann, E., ... Finkbeiner, M. (2015). Addressing Sustainability and Flexibility in Manufacturing Via Smart Modular Machine Tool Frames to Support Sustainable Value Creation. *Procedia CIRP*, 29, 514–519. <https://doi.org/https://doi.org/10.1016/j.procir.2015.02.181>.
- Porter, M. E. & Heppelmann, J. E. (2015). How Smart, Connected Products Are Transforming Companies. *Harvard Business Review*, 93, 1–37.
- Raguseo, E., Paolucci, E. & Neirotti, P. (2015). Exploring the tensions behind the adoption of mobile work practices in {SMEs}. *Business Process Management Journal*, 21(5), 1162–1185. <https://doi.org/10.1108/bpmj-12-2013-0155>.
- Rehage, G., Bauer, F., Gausemeier, J., Jurke, B. & Pruschek, P. (2013). Intelligent Manufacturing Operations Planning, Scheduling and Dispatching on the Basis of Virtual Machine Tools. In *{IFIP} Advances in Information and Communication Technology* (pp. 391–400). Springer Berlin

- Heidelberg. https://doi.org/10.1007/978-3-642-41329-2_38.
- Rennung, F., Luminosu, C.T. & Draghici (2016). A. Service Provision in the Framework of Industry 4.0. *ProcediaSoc. Behav. Sci.* 2016, 221, 372–377.
- Rogers, E. . & Trombley, D. (2014). The Benefits and Barriers to Smart Manufacturing (pp. 20–23). New Orleans, LA, USA,: In Proceedings of the 36th *Industrial Energy Technology Conference*.
- Rudtsch, V., Gausemeier, S., Gesing, J., Mittag, T. & Pattern, P. S. (2014). Based Business Model Development for Cyber-Physical Production Systems. *Procedia CIRP* 2014, 25, 313–319.
- Saberi, S. & Yusuff, R. M. (2011). Advanced manufacturing technology implementation performance: Towards a strategic framework. (pp. 22–24). Kuala Lumpur, Malaysia: *In Proceedings of the International Conference on Industrial Engineering and Operations Management*.
- Schmidt, R., Möhring, M., Härtig, R. C., Reichstein, C., Neumaier, P. & Jozinovic', P. (2015). Industry 4.0-potentials for creating smart products: Empirical research results. In *Business Information Systems*; Abramowicz, W., Ed.; Springer: Cham, Switzerland; pp. 16–27, ISBN 978-3-319-19027-3.
- Stock, T. & Seliger, G. (2016). Opportunities of Sustainable Manufacturing in Industry 4.0. *Procedia CIRP*, 40, 536–541. <https://doi.org/https://doi.org/10.1016/j.procir.2016.01.129>.
- Zhong, R. Y., Huang, G. Q., Lan, S., Dai, Q. Y., Chen, X. & Zhang, T. (2015). A big data approach for logistics trajectory discovery from {RFID}-enabled production data. *International Journal of Production Economics*, 165, 260–272. <https://doi.org/10.1016/j.ijpe.2015.02.014>.