

in implementing appropriate scenarios in apparel industry. The outcome of this study will help to guide future research on the development of standardized readiness assessment model for Industry 4.0 that fills the existing research gap.

References

- Atobishi, T., Gábor, S., Z., and Podruzsik, S., Cloud Computing And Big Data In The Context Of Industry 4.0: Opportunities And Challenges, *Proceedings of the IISES Annual Conference, Sevilla, Spain*, 2018.
- Babiceanu, R., F., and Seer, R., Big Data and virtualization for manufacturing cyber-physical systems: A survey of the current status and future outlook, pp.128-137, 2016.
- Basl, J., and Doucek, P., A Metamodel for Evaluating Enterprise Readiness in the Context of Industry 4.0, *Information*, vol. 10, no. 3, pp. 89,2019.
- Berger, R., Industry 4.0: The role of Switzerland within a European Manufacturing Revolution, March 2015.
- Bruno, F.D.S. and Pimentel, F., Apparel Manufacturing 4.0: A Perspective For The Future Of The Brazilian Textile And Apparel Industry, April 2016.
- Central Bank of Sri Lanka, *Annual Report 2018 | Central Bank of Sri Lanka*, Available: <https://www.cbsl.gov.lk/en/publications/economic-and-financial-reports/annual-reports/annual-report>, 13 Aug. 2019.
- CMMI for development, *Version 1.3: Framework*, Hanscom AFB, MA: SEI, 2010.
- Department of Census and Statistics, Annual Survey of Industries Sri Lanka, 2013.
- Dheerasinghe, R., Garment Industry in Sri Lanka Challenges, Prospects and Strategies, vol. 33, no. 1, p. 33, 2015.
- Dutta, S., Lanvin, B., and Vincent, S., W., Global Innovation Index 2019.
- Export Development Board, Export Performance Indicators of Sri Lanka Report of Export Development Board, 2018.
- Gökalp, E., Onuralp, M., Gökalp, P., and Eren, E., Industry 4.0 Revolution in Clothing and Apparel Factories: Apparel 4.0, December 2018.
- Gökalp, E., Şener, U., and Eren, E., P., Development of an Assessment Model for Industry 4.0, *Communications in Computer and Information Science Software Process Improvement and Capability Determination*, pp. 128–142, September 2017.
- Grieco, A., Caricato, P., Gianfreda, D., Pesceb, M., Rigonb, V., Tregnaghib, L., and Voglinob, A., An Industry 4.0 case study in fashion manufacturing, *Procedia Manufacturing*, vol. 11, pp. 871–877, 2017.
- Giusto, D., Iera, A., Morabito, G., and Atzori, L., The Internet of Things, 2010.
- Hermann, M., Pentek, T., and Otto, B., Design Principle for Industrie 4.0 Scenarios: A Literature Review, *Hawaii International Conference on System Sciences (HICSS)*, pp. 16, 2016.
- Hsu, C., Lee, T., and Kuo, H., Applying fuzzy theory based data mining to establish the female sizing systems, *Proceedings of the International Conference on Evolutionary Computation Theory & Applications*, 2009.
- Industry4WRD, National Policy on Industry 4.0, Ministry of International Trade and Industry (MITI), 2016.
- Jain, S., Bruniaux, J., Zeng, X., and Bruniaux, P., ‘Big data in fashion industry’, IOP Conf. Series: Materials Science and Engineering, vol. 254, p. 152005, 2017.
- Jayatilake, H., and Withanaarachchi, A., Industry 4.0 in Apparel-Manufacturing Sector: for Sri Lanka, August 2016.
- Jayatilake, H., and Rupasinghe, T., D., Implementing Industry 4.0 in the apparel industry; A study to design a customized smart apparel production plant, November 2016.
- Kelegama, S., *Ready-made garment industry in Sri Lanka: facing the global challenge*, Institute of Policy Studies, 2004.
- Kennedy, K., Everybody Immersive Fashion- Human-Computer Interaction in VR, *Artificial Intelligence on Fashion and Textiles Advances in Intelligent Systems and Computing*, pp. 37–43, 2019.
- Kitchenham, B., Procedures for Performing Systematic Reviews, Keele, UK, Keele Univ. 33, 28, July 2004.
- Lanza G., Nyhuis P., Ansari S.M., Kuprat T., and Liebrecht C., Empowerment and Implementation Strategies for Industry 4.0, *ZWF Zeitschrift für wirtschaftlichen Fabrikbetrieb*, 111 (1-2), pp. 76-79, 2016.
- Lee, J., Kao, H., A., and Yang, S., Service innovation & smart analytics for industry 4.0 & big data environment, *Procedia CIRP*, vol. 16, pp. 3–8, 2014.
- Leyh, C., Schäffer, T., Bley, K., and Forstenhäusler, S., SIMMI 4.0 – A Maturity Model for Classifying the Enterprise-wide IT and Software Landscape Focusing on Industry 4.0, *Proceedings of the 2016 Federated Conference on Computer Science and Information Systems*, Feb. 2016.
- Lichtblau, K., Stich, V., Bertenrath, R., Blum, M., Bleider, M., Millack, A., K. Schmitt, K., and Schmitz, E., Industrie 4.0- Readiness, 2015.
- Menon, K., Kärkkäinen, and H., Lasrado, L., A., Towards a Maturity Modeling Approach for the Implementation of Industrial Inter-net., *Proceedings of the Pacific Asia Conference on Information Systems (PACIS)*, 2016.
- Mohajeri, B., Paradigm Shift from Current Manufacturing to Social Manufacturing, June 2014.

- Molfino, R., Carca, E., Zoppi, M., Bonsignorio, F., Callegari, M., Gabrielli, A., and Principi, M., A Multi-Agent 3D Simulation Environment for Clothing Industry, *Simulation, Modeling, and Programming for Autonomous Robots Lecture Notes in Computer Science*, pp. 53–64, 2008.
- Monostori, L., Kádár, B., T., Bauernhansl, T., Kondoh, S., Kumara, S., Reinhart, G., Sauer, O., Schuh, G., Sihn, W., and Ueda, K., Cyber-physical systems in manufacturing, pp.621-641, 2016.
- Mourtzis, D., Papakostas, N., Mavrikios, D., Makris, S., and Alexopoulos, K., The role of simulation in digital manufacturing: applications and outlook, *International Journal of Computer Integrated Manufacturing*, 2015.
- Nayak, R. and Padhye, R., Artificial intelligence and its application in the apparel industry, *Automation in Garment Manufacturing*, pp. 109–138, 2018.
- Negahban, A., and Smith, J., Simulation for manufacturing system design & operation: Literature review, *Journal of Manufacturing Systems*, vol. 33, no. 2, pp. 241–261, 2014.
- OECD Science, Technology and Industry Scoreboard 2017: Digital Transformation' *OECD Publishing: France*, 2017.
- Oztemel, E., and Gursev, S., Industry 4.0 and related technologies, *Journal of Intelligent Manufacturing*, 2018.
- Popay, J., Roberts, H., Sowden, A., Petticrew, M., Lisa Arai, L., Rodgers, M., Britten, N., Roen, K., and Duffy, S., Guidance on the Conduct of Narrative Synthesis in Systematic Reviews, April 2006.
- PricewaterhouseCoopers, The Industry 4.0 / Digital Operations Self-Assessment, Available: <https://i40-self-assessment.pwc.de/>, 13 Aug, 2019.
- Rajani, Z., and Kocis, I., Assessing Industry 4.0 Readiness of Enterprises, *IEEE 16th World Symposium on Applied Machine Intelligence and Informatics*, February 7-10, Košice, Herl'any, Slovakia, 2018.
- Rockwell Automation, Rockwell Automation: The Connected Enterprise Maturity Model', 12, 2014.
- Rojko, A., 'Industry 4.0 Concept: Background and Overview', 2017.
- Sadiku, M., N., O., Wang, Y., Cui, S., and Musa, S., M. Industrial Internet Of Things, pp.1-5, 2017.
- Schumacher, A., Erol, S., and Sihn, W., A Maturity Model for Assessing and Maturity of Manufacturing Enterprises, *Procedia CIRP*, vol. 52, pp. 161–166, 2016.
- Schwab, K., The Global Competitiveness Report 2018, *World Economic Forum: Geneva, Switzerland*, 2018.
- Silva, R., K., J., D., Rupasinghe, T., D., and Apeageyi, P., A collaborative apparel new product development process model using virtual reality and augmented reality technologies as enablers, *International Journal of Fashion Design, Technology and Education*, vol. 12, no. 1, pp. 1–11, Nov. 2018
- Spahiu, T., Piperi, E., Grimmelsmann, N., Ehrmann, A., and Shehi, E., 3D Printing As A New Technology For Apparel Designing And Manufacturing, November 2016.
- SPICE, E., An Integrated Model for Enterprise-wide Assessment and Improvement, 2010.
- Suri, K., Cuccuru, A., Cadavid, J., Gérard, S., and Gaaloul, W., Model-based development of modular complex systems for accomplishing system integration for industry 4.0., *Proceedings of the 5th International Conference on Model-Driven Engineering and Software Development*, 2017.
- Toeters, M., Bhomer, T., Bottenberg, E., Tomico, O., Brinks, G., Vincenzini, P., and Carfagna, C., Smart & interactive Textiles, *Switzerland: TransTech Publications Ltd. Book Series: Advances in Science and Technology*, 2013.
- Xu, Y., Thomassey, S., and Zeng, X., AI for Apparel Manufacturing in Big Data Era, *Artificial Intelligence for Fashion Industry in the Big Data Era Springer Series in Fashion Business*, pp. 125–151, 2018.

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