



Influence of Project Risk Management in Micro and Small-Scale Industries on Workers' Occupational Health to Enhance Productivity: An Ergonomic Approach

J. Dhande^{a,*}  0000-0001-6136-683X, P. Rane^a  0000-0001-7618-5484,

H. Dhande^a  0000-0002-9963-4382

^a University of Michigan, Dearborn, United States

References

- [1] K. Hallberg, "Small and Medium Scale Enterprises: A Framework for Intervention, Small Enterprise Unit, Private Sector Development Department", The World Bank, Washington, DC, USA, 1999.
- [2] I. M. Ariful, J. D. Tedford and E. Haemmerle, "Strategic Risk Management Approach for Small and Medium-Sized Manufacturing Enterprises (SMEs)— A Theoretical Framework," 2006 IEEE International Conference on Management of Innovation and Technology, Singapore, 2006, pp. 694-698, doi: 10.1109/ICMIT.2006.262309.
- [3] S. Marcelino-Sádaba, A. Pérez-Ezcurdia, A. M. Echeverría Lazcano, and P. Villanueva, "Project risk management methodology for small firms," International Journal of Project Management, vol. 32, no. 2, pp. 327-340, 2014, doi: 10.1016/j.ijproman.2013.05.009.
- [4] A. Kolus, R. P. Wells, and W. P. Neumann, "Examining the relationship between human factors related quality risk factors and work-related musculoskeletal disorder risk factors in manufacturing," Ergonomics, vol. 65, no. 7, pp. 954-975, 2022, doi: 10.1080/00140139.2022.2119285.
- [5] K. Durczak and P. Rybacki, "Noise Emission in the Cabs of Modern Farm Tractors," Tehnički Vjesnik, vol. 30, no. 2, pp. 669-675, 2023, doi: 10.17559/TV-20220921083039.
- [6] T. Sasaki, K. Iwasaki, I. Mori, N. Hisanaga, and E. Shibata, "Overtime, job stressors, sleep/rest, and fatigue of Japanese workers in a company," Industrial Health, vol. 45, no. 2, pp. 237-246, 2007, doi: 10.2486/indhealth.45.237.
- [7] P. G. Dempsey, "Effectiveness of ergonomics interventions to prevent musculoskeletal disorders: Beware of what you ask," International Journal of Industrial Ergonomics, vol. 37, no. 2, pp. 169-173, 2007, doi: 10.1016/j.ergon.2006.10.009.
- [8] M. P. Da Silva, F. G. Amaral, H. Mandagara, and B. H. Leso, "Difficulties in quantifying financial losses that could be reduced by ergonomic solutions," Human Factors in Ergonomics & Manufacturing, vol. 24, no. 4, pp. 415-427, 2014, doi: 10.1002/hfm.20393.
- [9] I. Barros Garcia, J. Daaboul, A. Jouglet, and J. Le Duigou, "Comparing sequential and integrated models in Reconfigurable Manufacturing Systems optimization", International Journal of Industrial Engineering and Management, vol. 15, no. 2, pp. 140-155, 2024, doi: 10.24867/IJEM-2024-2-353.
- [10] V. N. Leopoulos, K. A. Kirytopoulos, and C. Malandrakis, "Risk management for SMEs: Tools to use and how," Production Planning & Control, vol. 17, no. 3, pp. 322-332, 2007, doi: 10.1080/09537280500285136.
- [11] W. Karwowski, "Symvatology: The science of artifact-human compatibility," Theoretical Issues in Ergonomics Science, vol. 1, no. 1, pp. 76-91, 2010, doi: 10.1080/146392200308480.
- [12] K. K. Dhande, "Practical approach towards issue on ergonomic training with respect to productivity improvement," Journal of Ergonomics, vol. 3, no. 2, 2013, doi: 10.4172/2165-7556.1000117.
- [13] A. A. Shikdar and N. M. Sawaqed, "Worker productivity, and occupational health and safety issues in selected industries," Computers & Industrial Engineering, vol. 45, no. 4, pp. 563-572, 2003, doi: 10.1016/S0360-8352(03)00074-3.
- [14] A. Knutsson and H. Bøggild, "Gastrointestinal disorders among shift workers," Scandinavian Journal of Work, Environment & Health, vol. 36, no. 2, pp. 85-95, 2010, doi: 10.5271/sjweh.2897.
- [15] M. van der Hulst, "Long workhours and health," Scandinavian Journal of Work, Environment & Health, vol. 29, no. 3, pp. 171-188, 2003, doi: 10.5271/sjweh.720.

- [16] S. Folkard and D. A. Lombardi, "Modeling the impact of the components of long work hours on injuries and 'accidents'," *American Journal of Industrial Medicine*, vol. 49, no. 11, pp. 953–963, 2006, doi: 10.1002/ajim.20307.
- [17] M. Nakashima et al., "Association between long working hours and sleep problems in white-collar workers," *Journal of Sleep Research*, vol. 20, no. 1, pp. 110–116, 2011, doi: 10.1111/j.1365-2869.2010.00852.x.
- [18] J.-T. Song, G. Lee, J. Kwon, J.-W. Park, H. Choi, and S. Lim, "The association between long working hours and self-rated health," *Annals of Occupational and Environmental Medicine*, vol. 26, no. 1, p. 2, 2014, doi: 10.1186/2052-4374-26-2.
- [19] A. Kolus, R. Wells, and P. Neumann, "Production quality and human factors engineering: A systematic review and theoretical framework," *Applied Ergonomics*, vol. 73, pp. 55–89, 2018, doi: 10.1016/j.apergo.2018.05.010.
- [20] H. F. Van der Molen, C. Foresti, J. G. Daams, M. H. Frings-Dresen, and P. P. F. Kuijer, "Work related risk factors for specific shoulder disorders: A systematic review and meta-analysis," *Occupational and Environmental Medicine*, vol. 74, pp. 745–755, 2017, doi: 10.1136/oemed-2016-104242.
- [21] W. IJzeilenberg, D. Molenaar, and A. Burdorf, "Different risk factors for musculoskeletal complaints and musculoskeletal sickness absence," *Scandinavian Journal of Work, Environment & Health*, vol. 30, no. 1, pp. 56–63, 2004, doi: 10.5271/sjweh.765.
- [22] R. Nie, J. Su, and S. Guo, "A PSM Model to Estimate the Impacts of Internet Use on Rural Residents' Health," *Tehnički Vjesnik*, vol. 30, no. 2, pp. 555–565, 2023, doi: 10.17559/TV-20221108034505.
- [23] G. C. David, "Ergonomic methods for assessing exposure to risk factors for work-related musculoskeletal disorders," *Occupational Medicine*, vol. 55, no. 3, pp. 190–199, 2005, doi: 10.1093/occmed/kqi082.
- [24] A. Bonnefond, M. Härmä, T. Hakola, M. Sallinen, I. Kandolin, and J. Virkkala, "Interaction of age with shift-related sleep-wakefulness, sleepiness, performance, and social life," *International Journal of Experimental Aging Research*, vol. 32, pp. 185–208, 2007, doi: 10.1080/03610730600553968.
- [25] P. W. Buckle and J. J. Devereux, "The nature of work-related neck and upper limb musculoskeletal disorders," *Applied Ergonomics*, vol. 33, no. 3, pp. 207–217, 2002, doi: 10.1016/S0003-6870(02)00014-5.
- [26] G. Costa, "The impact of shift and night work on health," *Applied Ergonomics*, vol. 27, no. 1, pp. 9–16, 1996, doi: 10.1016/0003-6870(95)00047-X.
- [27] T. Sukwika and R. Harjanto, "Ergonomic Risk Level of Fitting Production Department Workers in the Plastic Pipe Manufacturing Industry," *Journal of Engineering, Management and Information Technology*, vol. 2, no. 3, pp. 101–112, 2024, doi: 10.61552/JEMIT.2024.03.001.
- [28] S. Folkard and P. Tucker, "Shift work, safety and productivity," *Occupational Medicine*, vol. 53, no. 2, pp. 95–101, 2003, doi: 10.1093/occmed/kqg047.
- [29] X. Zhang, T. J. Dube, and K. A. Esser, "Working around the clock: circadian rhythms and skeletal muscle," *Journal of Applied Physiology*, vol. 107, no. 5, pp. 1647–1654, 2009, doi: 10.1152/jappphysiol.00725.2009.
- [30] Y.-Y. Hsu, C.-H. Bai, C.-M. Yang, Y.-C. Huang, T.-T. Lin, and C.-H. Lin, "Long hours' effects on work-life balance and satisfaction," *Journal of Environmental and Public Health*, vol. 2019, Article ID 5046934, 2019, doi: 10.1155/2019/5046934.
- [31] K. K. Dhande and S. Sharma, "Influence of shift work in process industry on workers' occupational health, productivity, and family and social life: An ergonomic approach," *Human Factors and Ergonomics in Manufacturing & Service Industries*, vol. 21, no. 3, pp. 260–268, 2010, doi: 10.1002/hfm.20231.
- [32] T. Åkerstedt, "Shift work and disturbed sleep/wakefulness," *Occupational Medicine*, vol. 53, no. 2, pp. 89–94, 2003, doi: 10.1093/occmed/kqg046.
- [33] F. Nachreiner, L. Lübeck-Plümer, and H. Grzech-Sukalo, "Changes in the structure of health complaints as related to shift exposure," *Work & Stress*, vol. 9, no. 2-3, pp. 227–234, 1995, doi: 10.1080/02678379508256558.
- [34] M. Takahashi and H. Arito, "Maintenance of alertness and performance by a brief nap after lunch under prior sleep deficit," *Sleep*, vol. 23, no. 6, pp. 813–819, 2000, doi: 10.1037/e361732004-005.
- [35] E. M. Ndivhudzannyi, "The study of work-related musculoskeletal disorders amongst workers in brick making factory in South Africa," M.S. thesis, Division of Industrial Ergonomics, Luleå University of Technology, Sweden, ISSN 1402-1617, Feb. 2003.
- [36] M. Hagberg et al., *Work Related Musculoskeletal Disorders: A Handbook for Prevention*, London, UK: Taylor & Francis, 1995.
- [37] T. Åkerstedt, P. Fredlund, M. Gillberg, and B. Jansson, "Work load and work hours in relation to disturbed sleep and fatigue in a large representative sample," *Journal of Psychosomatic Research*, vol. 53, no. 1, pp. 585–588, 2002, doi: 10.1016/S0022-3999(02)00447-6.
- [38] R. Van Der Merwe and S. Miller, *Measuring Absence & Labor Turnover: A Practical Guide to Recording and Control*, Johannesburg, South Africa: Lexicon Publishers, 1988.
- [39] A. J. Dababneh, N. Swanson, and R. L. Shell, "Impact of added rest breaks on the productivity and well-being of workers," *Ergonomics*, vol. 44, no. 2, pp. 164–174, 2010, doi: 10.1080/00140130121538.
- [40] T. Morken, et al., "Effects of a training program to improve musculoskeletal health among industrial workers—Effects of supervisors' role in the intervention," *International Journal of Industrial Ergonomics*, vol. 30, no. 2, pp. 115–127, 2002, doi: 10.1016/S0169-8141(02)00090-2.
- [41] D. Floyd and J. McManus, "The role of SMEs in improving the competitive position of the European Union," *European Business Review*, vol. 17, no. 2, pp. 144–150, 2005, doi: 10.1108/09555340510588011.
- [42] G. D. M. Potter, D. J. Skene, J. Arendt, J. E. Cade, P. J. Grant, and L. J. Hardie, "Circadian rhythm and sleep disruption: Causes, metabolic consequences, and countermeasures," *Endocrine Reviews*, vol. 37, no. 6, pp. 584–608, 2016, doi: 10.1210/er.2016-1083.
- [43] L. F. Berro, R. A. España, J. A. Mong, and R. W. Gould, "Editorial: Sleep and circadian rhythm disruptions associated with substance use disorders," *Frontiers in Neuroscience*, vol. 17, 2023, doi: 10.3389/fnins.2023.1165084.