

# Avtomatizacija procesov proizvodjanja in nočno delo

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## Povzetek

**Raziskovalno vprašanje (RV):** Kakšna je povezanost stopnje avtomatizacije procesov proizvodjanja in nočnega dela?

**Namen:** Opraviti empirično raziskavo o stopnji avtomatizacije procesov proizvodjanja v večjih slovenskih proizvodnih podjetjih ter obsegu nočnega dela proizvodnih delavcev in ugotoviti, ali višja stopnja avtomatizacije pomeni manjši obseg nočnega dela oziroma ugotoviti, ali obstaja kakšna statistično značilna povezanost navedenih dejavnikov.

**Metoda:** Na vzorcu 116 srednje velikih ali velikih slovenskih podjetij z najmanj 50 zaposlenimi in z registrirano predelovalno dejavnostjo smo opravili kvantitativno raziskavo, s katero smo skozi pet skupin aktivnosti oziroma opravil v proizvodnem procesu izmerili in izračunali skupno oceno stopnje avtomatizacije celotnega proizvodnega sistema ter izmerili in primerjali število človek/ur proizvodnih delavcev, opravljenih v nočni izmeni, napram številu človek/ur proizvodnih delavcev, opravljenih v celotnem delovnem dnevu. Izračunano oceno stopnje avtomatizacije posameznega proizvodnega sistema smo primerjali z deležem nočnega dela glede na vse delo v dnevu ter izračunali Pearsonov koeficient korelacije.

**Rezultati:** Izračunana povezanost dejavnikov je negativna, kar sicer pomeni, da večja kot je stopnja avtomatizacije procesov proizvodjanja, manj je nočnega dela, vendar gre za prenizko absolutno vrednost, da bi lahko govorili o statistično znatni povezanosti.

**Organizacija:** V povezavi z avtomatizacijo procesov proizvodjanja smo predstavili vidike in elemente avtomatizacije, ki lahko pripomorejo k učinkovitejši uvedbi avtomatizacije procesov proizvodjanja v organizaciji. V povezavi z nočnim delom smo predstavili argumente, zakaj je smiselno, da si vodstva organizacij omejevanje obsega nočnega dela zastavijo kot cilj, ter podali predloge, kako se zasledovanja tega cilja lahko lotijo.

**Družba:** Raziskava obravnava avtomatizacijo procesov proizvodjanja kot potencialno rešitev za odpravo oziroma omejitev nočnega dela, ter vseh negativnih vplivov nočnega dela tako na delavca – posameznika, kot na njegov ožji in širši socialni krog. Na podlagi ugotovitev smo podali predloge, ki lahko pripomorejo k odpravi oziroma omejitvi nočnega dela in tako vplivajo na organizacijo delovnega časa in kakovost delovnega življenja posameznika.

**Originalnost:** Raziskava obravnava dva vsebinsko popolnoma nesorodna dejavnika, ki z vidika medsebojne povezanosti v dosedanjih raziskavah še nista bila obravnavana.

**Omejitve/nadaljnje raziskovanje:** Raziskave ni možno posplošiti na organizacije storitvenih dejavnosti, prav tako je ni možno posplošiti na aktivnosti v podjetjih z redistrirano predelovalno dejavnostjo, ki ne potekajo v okviru proizvodnega sistema. Raziskovanje avtomatizacije procesov in nočnega dela bi bilo koristno opraviti tudi v drugih dejavnostih, ki sicer niso proizvodno naravnane, a je kljub temu takšna oblika dela nujno potrebna in neizogibna, npr. v zdravstvu, trgovini, policiji, medijih, vojski ipd.

**Ključne besede:** menedžment, avtomatizacija, stopnja avtomatizacije, proces proizvodjanja, nočno delo, nočna izmena, podjetja, proizvodjanje, predelovalna dejavnost, raziskava.

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**Urška Kosem\*** je dodiplomski študij leta 2016 zaključila na Fakulteti za Management v Kopru ter pridobila naziv diplomirana ekonomistka (UN). V okviru dodiplomskega študija so jo pritegnile teme v povezavi z inovacijami ter sodobnimi poslovnimi pristopi, zato je podiplomski študij nadaljevala na isti fakulteti na programu inoviranje in podjetništvo. Že tekom študija se je zaposlila na Triglav, Zdravstveni zavarovalnici, v času zaposlitve pa so jo pričele zanimati tematike v povezavi z zdravjem in dobrobitom človeka. Slednjih se je posredno dotaknila tudi v magistrskem delu, v katerem je raziskovala potencial avtomatizacije za omejitev nočnega dela in s tem povezanih negativnih vplivov na človeka, s čimer je v letu 2019 zaključila magistrski študij ter pridobila naziv magistrica inoviranja in podjetništva.

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**Mirko Markič** je doktoriral na Fakulteti za organizacijske vede Univerze v Mariboru s področja organizacijskih ved na temo inoviranja. Po dvanajstih letih delovanja v gospodarstvu se je zaposlil na Fakulteti za menedžment Univerze na Primorskem. Je redni profesor za področje menedžmenta in znanstveni svetnik ter vodja ali član 17 raziskovalnih projektov in projektov z gospodarstvom. Njegova bibliografija obsega več kot 630 enot s področja upravnih in organizacijskih ved ter javnega zdravstva (varstvo pri delu).

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# Automation of manufacturing processes and night work

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## Abstract

**Research Question (RQ):** What is the correlation between the level of automation of manufacturing processes and the amount of night work?

**Purpose:** The purpose is to carry out an empirical study on the level of automation of manufacturing processes in larger Slovenian manufacturing companies and the amount of night work carried out by production workers and to determine whether a higher level of automation signifies a smaller amount of night work or to determine whether there is any statistically significant correlation between the said factors.

**Method:** A quantitative survey was conducted on a sample of 116 medium-sized or large Slovenian manufacturing companies with at least 50 employees, to evaluate the level of automation of the entire production system through five groups of activities that occur within the production process. We compared the number of man-hours of production workers carried out during the night shift to the number of man-hours of production workers carried out throughout the whole workday. The estimated level of automation of each production system was then paired with the share of night work in relation to all days' work, and the Pearson correlation coefficient was calculated.

**Results:** The calculated correlation is of negative value, which means that the higher the level of automation of the manufacturing processes, the smaller the amount of the night work, but the absolute value is too low to speak of a statistically significant correlation.

**Organization:** In relation to the automation of manufacturing processes, we have presented aspects and elements of automation that can help implement automation of manufacturing processes in an organization more effectively. In relation to night work, we have presented arguments as to why it makes sense for management to set a restriction on the amount of night work as a goal, and provide suggestions on how to pursue the said goal.

**Society:** The research considers the automation of production processes as a potential solution for eliminating or limiting the amount of night work, as well as all the negative effects of night work on both the worker – an individual and also on his or hers social circle. Based on the findings, we have made proposals that can help eliminate or limit night work and thus affect the organization of working time and the quality of working life of an individual.

**Originality:** The research addresses two substantively unrelated factors which have not yet had its potential correlation studied before.

**Limitations / further research:** Research cannot be generalized to service organizations, nor can it be generalized to activities in manufacturing companies that do not take place within the production system. Researches on the automation and night work would also be useful to undertake based on other activities that are not manufacturing oriented, yet is such a form of work still absolutely necessary and inevitable, e.g. in healthcare, trade, police, media, military, etc.

**Keywords:** management, automation, level of automation, manufacturing process, night work, night shift, companies, production, manufacturing industry, research.

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**Urška Kosem\*** studied at the Faculty of Management in Koper and gained an academic bachelor degree in economics in 2016. During the undergraduate study, she was drawn to themes regarding innovation and modern business approaches, which is why she continued the graduate studies on the programme of innovation and entrepreneurship. While still studying, she was employed by Triglav, health insurance company. During the time of employment she began to show interest in themes concerning human welfare and health. The latter, she indirectly addressed with her master's thesis, in which she was looking into the potential of automation for limiting night work and the negative influences night work has on a worker. She finished the programme in 2019 and gained the title of Master in Innovation and Entrepreneurship.

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**Mirko Markič** received a doctoral degree from the Faculty of Organisational Sciences, the University of Maribor. After working in the economic sector for twelve years, he started employment with the Faculty of Management, the University of Primorska. He is a professor of management and a research councillor. He is also a head/member of 17 research and entrepreneurial projects. His bibliography includes more than 630 units in the fields of administration and organization sciences and the field of public health service (health and safety at work).

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