

Automation in Construction Industry it's Application and Barriers to Implementation on Construction Site

S. Abishek¹, Mr. P. A. Prabakaran², Ms. U. Sindhu Vaardini³, Mr. A. Aswin Bharath⁴

M.E Student Construction Management¹, Assistant Professor^{2,3,4}

Kumaraguru College of Technology, Coimbatore, Tamil Nadu, India^{1,2,3,4}

abishekaswin05022001@gmail.com

Abstract: Automation is transforming the construction sector, providing benefits such as better productivity, improved safety, and lower prices. Automation is used in a wide range of construction applications, from heavy equipment to off-site construction approaches such as prefabrication and modular construction. In front of this, the focus of this research is to determine the extent to which the use of automation, if entirely applied in construction sector, it also has a negative impact on the delivery of building projects. Modern equipment has helped the development of the construction industry. Several disadvantages of automated constructions are causing worker displacement, creating emotional stress for the workers, higher level of maintenance, high capital expenditures, causing geographical displacement of workers, lower degree of flexibility, employee dissatisfaction, decrease in productivity and the enslavement of labor by automated machinery.

Keywords: Construction sector, building projects, geographical displacement, automated machinery

REFERENCES

- [1]. Alwasel, A., Elrayes, K., Abdel-Rahman, E., & Haas, C (2012), "Reducing Shoulder Injuries among Construction Workers – The International Association for Automation and Robotics in Construction". Reducing Shoulder Injuries among Construction Workers – the International Association for Automation and Robotics in Construction.
- [2]. Aghimien D O, Aigbavboa C O, Oke A E and Thwala W D A, "Dynamic capabilities for digitalisation in the AECO sector – a scientometric review" (2021, April 29). Emerald Insight. Dynamic Capabilities for Digitalisation in the AECO Sector – a Scientometric Review, pp-1063-1079.
- [3]. Asprone D. and Auricchio F (2018, January 10), "3D printing of reinforced concrete elements: Technology and design approach", 3D Printing of Reinforced Concrete Elements: Technology and Design Approach, Issue:165, pp. 218-231, 2017.
- [4]. Ahn C.R., Lee S., and Peña-Mora F, (2013). "Application of Low-Cost Accelerometers for Measuring the Operational Efficiency of a Construction Equipment Fleet", Journal of Computing in Civil Engineering, volume 29, Issue 2.
- [5]. Bock.T, (2015, August 12), "The future of construction automation: Technological disruption and the upcoming ubiquity of robotics". The Future of Construction Automation: Technological Disruption and the Upcoming Ubiquity of Robotics – ScienceDirect, Issue-59, pp-113-121, 2015.
- [6]. Chamberlain, (2003, February 12), "Driving forces and status of automation and robotics in construction in Europe", Driving Forces and Status of Automation and Robotics in Construction in Europe.
- [7]. Davila Delgado, J. M., Oyedele, L., Ajayi, A., Akanbi, L., Akinade, L., Bilal, M., &Owolabi, H, (2019). "Robotics and automated systems in construction: Understanding industry-specific challenges for adoption", Issue-26.
- [8]. E. Cottle (2015, April 8), "The Transformation of the Construction Sector in South Africa since apartheid: Social inequality and labour".

- [9]. Furuya, N., Shiokawa, T., Hamada, K., Kurita, K., Kunimoto, I., Miyakawa, H. (1995) Present “Circumstances of an Automated Construction System for High-Rise Reinforced Concrete Buildings”, In International Symposium on Automation and Robotics in Construction, Taipei, Taiwan, Pp- 953-958, 2000, ISSN 2413-5844.
- [10]. H. Ardiny, S. Witwicki, F. Mondada, (2015), “Construction automation with autonomous mobile robots: a review”, 2015 3rd RSI International Conference on Robotics and Mechatronics (ICROM), IEEE, 2015, pp. 418–424
- [11]. Huang Yurong (2019), “Design and Application of Automatic Control System for Construction Machinery under Energy conservation and Environmental Protection”. Modern Manufacturing Technology and Equipment, ISSN 2616-7433 Vol. 4, Issue 5: 51-54.
- [12]. Jan Willmann, M. K. (2016 January) Switzerland, “Robotic timber construction- “Expanding additive fabrication to new dimensions”. Researchgate, pp-16-23, Volume-61, doi:10.1016.
- [13]. J.M. Davila Delgado, L. Oyedele, A. Ajayi, L. Akanbi, O. Akinade, M. Bilal, H. Owolabi (2019), “Robotics and automated systems in construction: understanding industry-specific challenges for adoption”, J. Build. Eng, Issue-26.
- [14]. J. Czarnowski, A. Dąbrowski, M. Macias, J. Głowka, J. Wrona (2018), “Technology gaps in human-machine interfaces for autonomous construction robots”, Automatic Constr, Volume-94 (2018), pp. 179-190.
- [15]. J. Andres, T. Bock, F. Gebhart, W. Steck,(1994), “First results of the development of the masonry robot system ROCCO: A fault tolerant assembly tool, in: D.A. Chamberlain” (Ed.), Automation and Robotics in Construction Xi, Elsevier, Oxford, 1994, pp. 87–93.
- [16]. Liu, D.; Wang, Y.; Chen, J.; Zhang, Y.(2020), “Intelligent Compaction Practice and Development: A Bibliometric Analysis”, Eng. Constr. Archit. Manag, Volume-27, pp.1213–1232.
- [17]. LieyunDing.W.J (2019, January), “BIM-Based task-level planning for robotic brick assembly through image- based 3D modelling”, Research gate, Volume-43, 100993.doi:10.1016
- [18]. Marcher C, Giusti A, Schimanski C P and Matt D T (2019), “Application of Decision Support Systems for Advanced Equipment Selection in Construction Cooperative Design, Visualization, and Engineering”, Lecture Notes in Computer Science, ed Y Luo (Cham: Springer International Publishing) Volume:11792, pp 229–35.
- [19]. M. Bechthold, (2011), “Integrated environmental design and robotic fabrication workflow for ceramic shading systems”, Proceedings of 28th International Symposium on Automation and Robotics in Construction (ISARC2011), Seoul, 2011.
- [20]. Q. Chen, B. Garcíade Soto, B.T. Adey (2018), “Construction automation: research areas, industry concerns and suggestions for advancement”, Autom. Constr., Volume-94, pp. 22-38.
- [21]. Taylor, M., Wamuziri, S., Smith, I, (2003), “Automated construction in Japan. Proceedings of the Institution of Civil Engineers-Civil Engineering”, Volume- 156,pp.34-41.
- [22]. Wakisaka, T., Furuya, N., Inoue, Y., Shiokawa, T. (2000), “Automated construction system for high-rise reinforced concrete buildings”, Volume- 9(3),pp.229-250.