

Industry 4.0 – present and future trends in infrastructure and construction public-private partnerships in Europe: comparative perspective

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Introduction

The paper explores the role of Industry 4.0 in enhancing public-private partnership (PPP) projects in the infrastructure and construction sectors across Europe. It highlights the need for incorporating digital innovations to improve the effectiveness and reduce the costs of these projects.

Industry 4.0 technologies, such as artificial intelligence, cloud solutions, 3D printing, and the Internet of Things, are seen as catalysts for transforming traditional construction practices by automating processes and improving the qualifications of the workforce.

Methodology

The study employs a time series analysis and surveys data from the European PPP Expertise Centre (EPEC) covering 2012-2020, complemented by a survey assessing the potential of Industry 4.0 technologies in PPP projects.

Findings and Attitudes

The study reveals varied attitudes towards adopting Industry 4.0 in PPP projects across different European countries, with general agreement on the benefits of BIM, but more varied responses to other technologies like AI and drones.

Key Technologies in PPP Projects

- **Building Information Modelling (BIM):** Essential for digitization in construction, enhancing collaboration and integration in PPP projects.
- **Automation and Robotics:** Includes advanced technologies like 3D printing, reducing manual labor and improving efficiency.
- **Artificial Intelligence (AI):** Applies to planning, design, and management, providing innovative financing plans and risk management.
- **Drone Photogrammetry and Laser Scanning:** Offers enhanced data collection for planning and monitoring, improving project management and cost efficiency.

Conclusions

The integration of Industry 4.0 technologies into PPP projects is viewed positively, with significant potential to enhance project outcomes and efficiency. However, the adaptation and investment by both public and private sectors are crucial for realizing these benefits.

Suggested areas for further study include broader geographic focus beyond Europe, inclusion of other industries, and exploration of demographic differences in attitudes towards technology in PPP projects.