
ABSTRACTS

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Modelling the influence of transport accessibility, safety and affordability on mobility patterns among domestic workers in the City of Johannesburg

(pages 1-16)

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Keywords: transportation equity, domestic workers, urban transport challenges, transport accessibility and social exclusion.

Abstract: Household workers face transportation challenges, including limited access to safe, affordable, and reliable public transport, which constrains their mobility and promotes socio-economic exclusion. This study investigated the effects of transport accessibility, affordability, and perceptions of safety on live-out domestic workers' mobility in the City of Johannesburg, South Africa. With a 233-participant cross-sectional survey and Partial Least Squares Structural Equation Modelling (PLS-SEM), the study analyses both direct and mediated relationships between mobility patterns, affordability, perceptions of safety, and transport accessibility. The results reveal that perceptions of safety and transport accessibility have a direct effect on mobility patterns with less direct impact by affordability. Results demonstrate how safety perceptions operate as the intermediary between transport accessibility and mobility activities that signifies the importance of secure transit settings to adopt this low-income, female-dominated workforce. The study developed and tested a model of transport access and mobility to investigate how transport accessibility, safety perceptions, and cost influence commuting behaviours in this low-income, predominantly female workforce. Future research can use this model to examine similar factors in other locations. The study highlights the need for inclusive transport policy that integrates human flow management and material flow optimization within urban logistics systems.

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The impact of road infrastructure quality and network density on road accident numbers in Poland

(pages 17-21)

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Keywords: road safety, road infrastructure, roads, traffic accidents, infrastructure quality.

Abstract: This study examines how road infrastructure quality and public road network density influence road accident numbers in Poland between 2010 and 2024. Using annual national-level data on public road density, total and upgraded hard-surfaced roads, and motorways and expressways per 10,000 inhabitants, a log-linear regression model with HAC Newey–West standard errors was applied to estimate elasticities. Results show that higher public road density slightly increases accident numbers, while a greater total length of hard-surfaced roads reduces them. Upgraded roads exhibit a positive association with accidents, suggesting potential behavioral or traffic exposure effects, whereas motorway and expressway density strongly decreases accident rates. These findings highlight the complex interplay of infrastructure quality, network expansion, and traffic exposure, providing guidance for policymakers to prioritize investments in high-standard roads while monitoring upgraded segments for safety outcomes.

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Design and manufacture of pineapple cutting machines (pages 22-29)

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Keywords: pineapple cutting machine, low-cost design, peeling and coring, prototype development.

Abstract: Pineapple processing is traditionally performed manually, which is labor-intensive, inconsistent, and prone to safety risks. While industrial scale machines exist, their high cost and complexity limit accessibility for small and medium scale enterprises or household level use. This study addresses this gap by presenting the design and manufacture of a simple and low-cost pineapple cutting machine. The machine integrates peeling, quartering, and coring operations into a single stroke using a specially designed knife assembly fabricated from food-grade stainless steel. A prototype was fabricated and tested, confirming that the design meets essential requirements for cutting precision, safety, and ease of use while remaining economically feasible. The outcomes demonstrate that efficiency and consistency can be achieved without reliance on complex mechanisms, making the machine particularly suitable for small enterprises and local markets. Future work will focus on enhancing blade durability, introducing automated fruit feeding, and conducting large-scale performance evaluations.

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Technological solution for improving productivity and efficiency in manufacturing processes (pages 30-35)

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Keywords: wood-processing industry, technological modernization, drying technology, productivity, energy efficiency.

Abstract: The aim of this paper is to evaluate the impact of technological modernization on productivity, efficiency, and energy performance of manufacturing processes. In wood-processing production, the drying operation represents a critical technological stage due to its high time and energy demands. The applied methodology is based on a comparative case study approach. It includes technical, productivity, efficiency, and economic assessments of the existing drying technology and the proposed modern automated drying kiln. Productivity was evaluated as production output per unit of time, while efficiency was assessed using specific energy consumption per unit of dried lumber volume. The analysis was conducted using operational data obtained directly from the manufacturing environment. The results confirm that the modernization of drying technology leads to a significant reduction in drying cycle duration, enabling higher throughput and increased productivity without additional labour input. The modernization resulted in a productivity increase of up to 45% and a reduction in specific energy consumption of up to 25%. The economic evaluation demonstrates that productivity growth and energy savings create favourable conditions for reducing unit production costs and improving capacity utilisation. The findings indicate that targeted technological modernization of key production operations represents an effective tool for increasing productivity and efficiency in wood-processing manufacturing and provides a practical basis for investment decision-making and process optimisation.

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Applications of IDMA technology in US Patents

(pages 36-39)

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Keywords: US Patents, IDMA, working principles, advantages.

Abstract: Interleave Division Multiple Access (IDMA) is a promising multiple access technique for wireless communication systems because of its potential to enhance spectral efficiency, mitigate interference, and support reliable multi-user transmission. This paper presents the fundamental principles of IDMA, with emphasis on user-specific interleaving, symbol mapping onto available time slots, and the corresponding deinterleaving and recovery process at the receiver. The main advantages of IDMA are discussed, including improved spectral efficiency, better error performance, lower implementation complexity, flexibility for diverse wireless environments, and increased communication security through user-specific interleaver sequences. In addition to the theoretical overview, the paper reviews selected United States patents related to IDMA and closely associated non-orthogonal multiple access approaches published between 2020 and 2025. The analysed patents cover a wide range of applications, including narrowband machine-type communication, random access procedures, asynchronous coded multiple access combined with OFDM, wireless network control, storage systems, and joint transmissions in shared wireless resources. The review demonstrates that IDMA principles continue to be adapted and extended in response to the evolving requirements of modern wireless communication technologies. The examined patent activity confirms the ongoing technological relevance of IDMA and related multiple access schemes and highlights their potential for efficient, scalable, and interference-resilient communication in advanced wireless networks.

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Implementation of robotic workstations in internal enterprise logistics: analysis of efficiency, safety, and economic benefits in the context of Industry 4.0

(pages 40-50)

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Keywords: internal logistics robotization, automated logistics systems, logistics process efficiency, Industry 4.0.

Abstract: The article addresses the implementation of robotic workstations in internal logistics with the aim of analysing the impact of automation on the efficiency of logistics processes and identifying key factors for the successful deployment of robotic systems. Contemporary logistics processes face increasing demands for flexibility, speed, accuracy, and cost reduction, while traditional material handling and transport methods based on manual labour often result in higher error rates, inefficient use of the workforce, and increased risk of occupational injuries. In the context of digitalisation and the Industry 4.0 concept, it is therefore necessary to reassess existing practices and adopt intelligent automated solutions. The research is based on the analysis of existing implementations of robotic systems in industrial enterprises and on evaluating their benefits in terms of productivity, safety, and economic efficiency. The study examines technologies such as automated storage systems, robotic manipulators, autonomous mobile robots (AMR), and automated guided vehicles (AGV), including their integration into existing logistics processes. The results indicate a significant increase in the performance and reliability of internal transport, a reduction in operating costs and material handling errors, and improvements in workplace safety. At the same time, the main barriers to implementation are identified, including investment intensity and the need for organisational changes. The article provides recommendations for the effective integration of robotic technologies aimed at enhancing the competitiveness and sustainability of industrial enterprises.

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6G technology: the time has come

(pages 51-56)

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Keywords: 6G technology; architecture, applications.

Abstract: The sixth generation of wireless communication technology, or 6G technology, was created to replace 5G. Compared to its predecessors, it promises much faster speeds, more capacity, and reduced latency, opening up new applications and advancing a number of industries. Terabits per second (Tbps) is the target data rate for 6G, which is substantially faster than 5G's gigabits per second (Gbps). In order to facilitate real-time applications and instantaneous data transfer, 6G aims for nearly zero latency, possibly as low as the microsecond level. Compared to 5G's 1 million connected devices per square kilometer, 6G will allow for a potentially 10 million more. With the help of AI and machine learning, 6G will be able to manage resources intelligently, perform better, and add new features. It is anticipated that 6G will facilitate developments in fields such as imaging, location awareness, presence technology, and the Internet of Things (IoT). A review of earlier work is presented in this paper.
