Popular Science Summary for MASTER THESIS:

LIFE CYCLE COST ANALYSIS OF FIRE DETECTION SYSTEMS

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Ensuring Safety Through Cost-Effective Fire Detection

Fire detection systems are crucial in safeguarding buildings, people, and valuable assets from the devastating effects of fire. This master's thesis conducted at the European Organization for Nuclear Research (CERN), delves into the economic aspects of fire detection systems, aiming to determine the most cost-effective solutions over their entire lifespan.

Fire Detection Systems: An Overview

CERN, known for housing the Large Hadron Collider and numerous other high-tech facilities, relies heavily on sophisticated fire detection systems to protect its infrastructure and personnel. These systems include optical point detectors and aspirating smoke detectors, each with unique capabilities and costs. The thesis evaluates these technologies' performance and reliability in preventing fire-related damage.

Methodology: Cost-Benefit Analysis

The core of this research is a comprehensive cost-benefit analysis using the Present Net Value (PNV) methodology. This approach assesses the total costs and benefits of fire detection systems over their lifecycle, including initial installation, maintenance, and operational costs. The analysis also considers the potential losses prevented by early fire detection.

Key Findings

Economic Efficiency: The study reveals that investing in new, advanced fire detection systems can be more cost-effective in the long run, especially when these systems significantly reduce fire-related damages.

Decision-Making Insights: The findings provide valuable guidance for facility managers and policymakers in both public and private sectors. By illustrating the financial benefits of robust fire detection systems, the thesis supports informed decision-making regarding resource allocation for fire safety measures.

Implications for Future Work

The research underscores the importance of ongoing evaluation and improvement of fire detection technologies. Future studies could expand on this work by exploring new detection methods, integrating smart technologies, and examining their cost-effectiveness in various settings beyond scientific facilities.

Conclusion

This thesis offers a detailed economic perspective on fire detection systems, highlighting the importance of investing in advanced technologies to ensure safety and minimize costs over time. This research not only enhances our understanding of fire safety economics but also provides practical recommendations for improving fire detection strategies in high-tech environments like CERN.