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Strategic Role of Product Lifecycle Management (PLM) in Enhancing Operational Efficiency and Innovation in Product-Based Organizations

Nishant Pal

BBA (Business Analytics), Galgotias University

Under the Supervision of Dr. Gaurav Gupta

ABSTRACT:

This paper explores the strategic impact of Product Lifecycle Management (PLM) in product-based organizations. Using a mixed-methods approach involving surveys, interviews, and case studies, the research investigates PLM's influence on product development efficiency, cross-functional collaboration, product quality, and strategic alignment. The findings reveal that while PLM maturity strongly correlates with key performance indicators, challenges such as system integration, user resistance, and training gaps impede full realization of its benefits.

Introduction

Global competition and shorter innovation cycles demand agile, integrated systems to manage product development. PLM offers a comprehensive solution spanning from design to disposal. However, adoption challenges remain, such as integration with legacy systems and organizational resistance.

Literature Review

Scholars like Stark (2015) and Grieves (2006) emphasize PLM as a cross-functional enabler that integrates people, data, and processes. Studies show that over 50% of PLM initiatives fail to meet expectations due to poor strategic alignment (McKinsey, 2020). The literature also highlights the benefits of collaboration and innovation through PLM, while underscoring adoption barriers.

Objectives and Hypotheses

- To assess PLM's effect on product development efficiency.
- To evaluate its role in cross-functional collaboration.
- To understand challenges in PLM adoption.

Hypotheses:

- H1: PLM reduces time-to-market.
- H2: PLM improves interdepartmental collaboration.
- H3: PLM maturity enhances product quality and customer satisfaction.
- H4: Integration challenges hinder PLM deployment success.

Methodology

- **A mixed-method approach was used:**
Quantitative: Online surveys from 48 professionals across sectors like automotive and electronics.
Qualitative: Semi-structured interviews with 9 PLM professionals.
Tools: SPSS and Excel for statistical analysis; Likert-scale surveys; regression and correlation analyses.

Findings

H1–H3 were supported with statistically significant correlations.

- Common challenges: integration with ERP, user resistance, and high initial cost.
- Organizations with mature PLM systems reported better product quality and faster innovation.

- Executive sponsorship and training were crucial for success.

Discussion

The data indicates that PLM, when strategically implemented, significantly boosts operational efficiency. Integration and change management are recurring hurdles. Qualitative data reinforced that user training and phased rollouts mitigate adoption risks.

Limitations

- Sample size limited to 48 respondents.
- Data is self-reported, risking bias.
- Cross-sectional design limits long-term impact analysis.

Conclusion

PLM is more than a software—it's a strategic framework. Organizations must align PLM with business goals, invest in user training, and focus on integration to harness its full potential.

Recommendations

- Adopt phased PLM implementation
- Integrate with ERP and CRM systems.
- Regularly train users and establish PLM champions.
- Track KPIs to measure ROI and refine strategy.

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