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Urban Parking Challenges and Solutions: A Case Study

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INTRODUCTION

Background information & Market Context

- Urban growth and rising vehicle ownership increase parking demand and congestion (Gao et al., 2017).
- Parking affects commute time, economy, and environment; poor access worsens emissions and stress (Yang & Wang, 2019).
- Smart tech (AI apps, sensors, dynamic pricing) improves parking efficiency and space use (Ji et al., 2018).

Problem Statement

- Smart parking tech is growing in cities but **underused on campuses**.
- Need to assess its impact on user satisfaction in institutional settings.

Stakeholders

- Administrators & policymakers shaping campus parking.
- Support broader urban development goals.

Research Objectives

- Identify **key satisfaction factors** using survey & regression.
- Recommend policies to improve parking services.

Expected Impact

- Help universities improve parking services based on real user feedback.
- Support smarter, user-focused parking strategies for future urban planning..

MATERIALS, METHODS & IMPLEMENTATION

- Survey of 873 campus users collected data on parking behavior, perceptions, and demographics.
- Questions focused on search time, costs, enforcement, tech openness, and satisfaction levels.
- Ordinal logistic regression used to identify key factors influencing satisfaction.
- Model assumptions tested (VIF, proportional odds) and validated for robust analysis.

RESULTS

✅ **Model Fit**:
- Chi-square = 265.178 ($p < 0.001$) → model significantly explains satisfaction variability.
- Nagelkerke $R^2 = 0.45$ → moderate explanatory power.

⏱️ **Search Time Matters**:
- Searching less than 5 minutes significantly increases satisfaction.
- Longer search times lead to dissatisfaction.

🔍 **Parking Difficulty**:
- Easier parking strongly associated with higher satisfaction.
- Perceived difficulty in finding parking lowers satisfaction.

🚧 **Zone Availability**:
- Users rarely finding their preferred zone full report higher satisfaction.

💲 **Cost Perception**:
- Users who find parking fees reasonable are more satisfied.
- Strong disagreement with pricing fairness significantly reduces satisfaction.

📢 **Communication & Enforcement**:
- Poor communication of rules and unfair enforcement negatively affect satisfaction.
- Consistency and fairness in enforcement are key.

🤖 **Technology Readiness**:
- Openness to AI apps not significantly linked to satisfaction—indicates low awareness or usage.

📉 **Other Factors**:
- Length of time parked on campus, promptness of enforcement, and penalties were **not significant** predictors.

CONCLUSION & IMPLEMENTATION PATH

Conclusion

- Key satisfaction drivers: short search times, easy access, fair pricing, and clear enforcement.
- AI apps show potential but need better promotion and user engagement.

Implementation Path

- Increase parking availability and optimize space distribution.
- Use IoT sensors and real-time info systems to reduce search time.
- Ensure fair, transparent pricing and clear rule communication.
- Promote and integrate smart technologies for wider adoption.

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