



# Optimizing Subsidized Housing Construction Using Critical Path Method (CPM)



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# Research Background



## Current Housing Situation in Samarinda

- Housing Market Analysis:
  - 123 total housing estates
  - 20 subsidized housing projects (16.3%)
  - 4 mixed housing developments (3.3%)
  - Growing demand for affordable housing

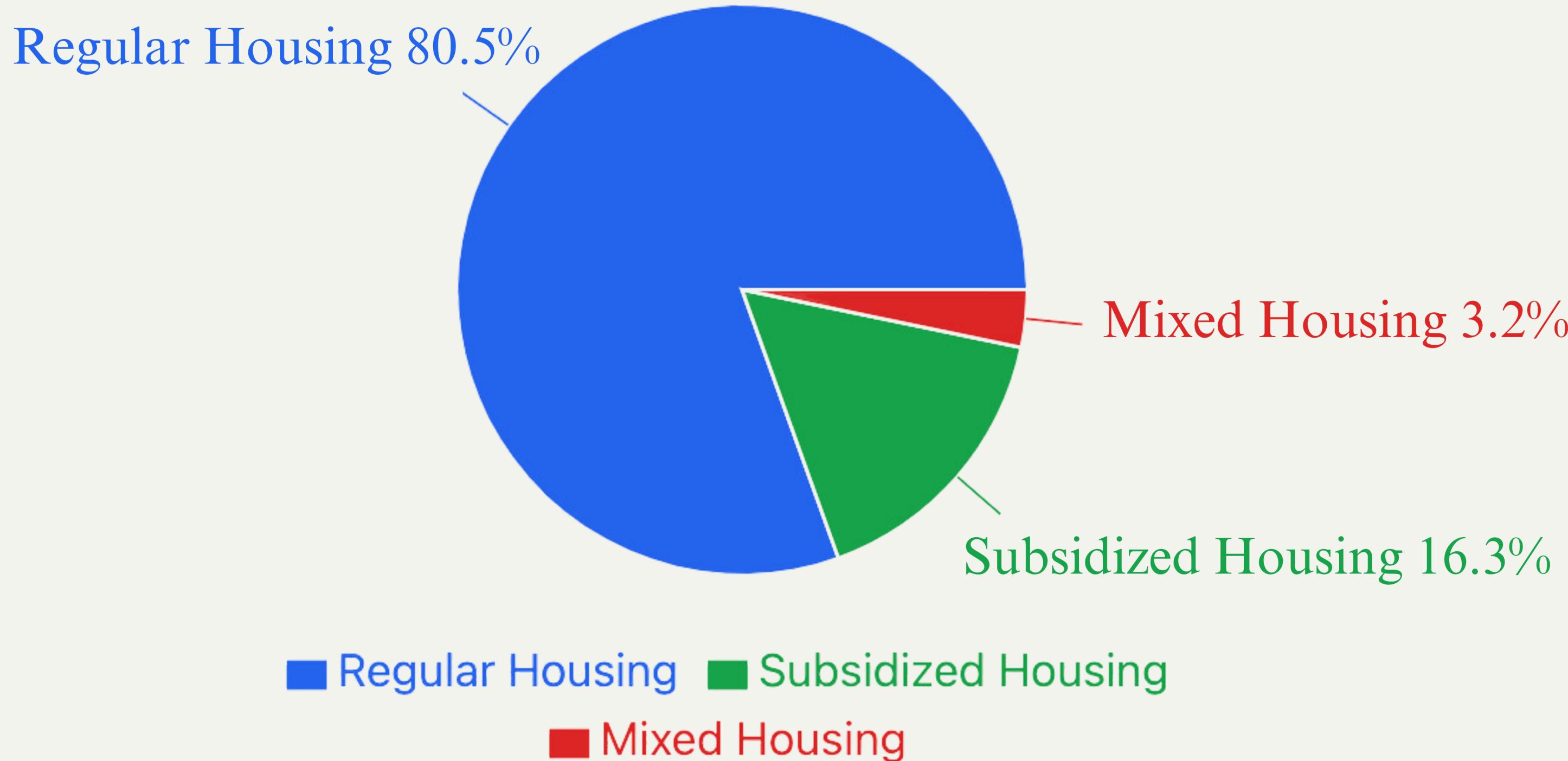


# Research Background

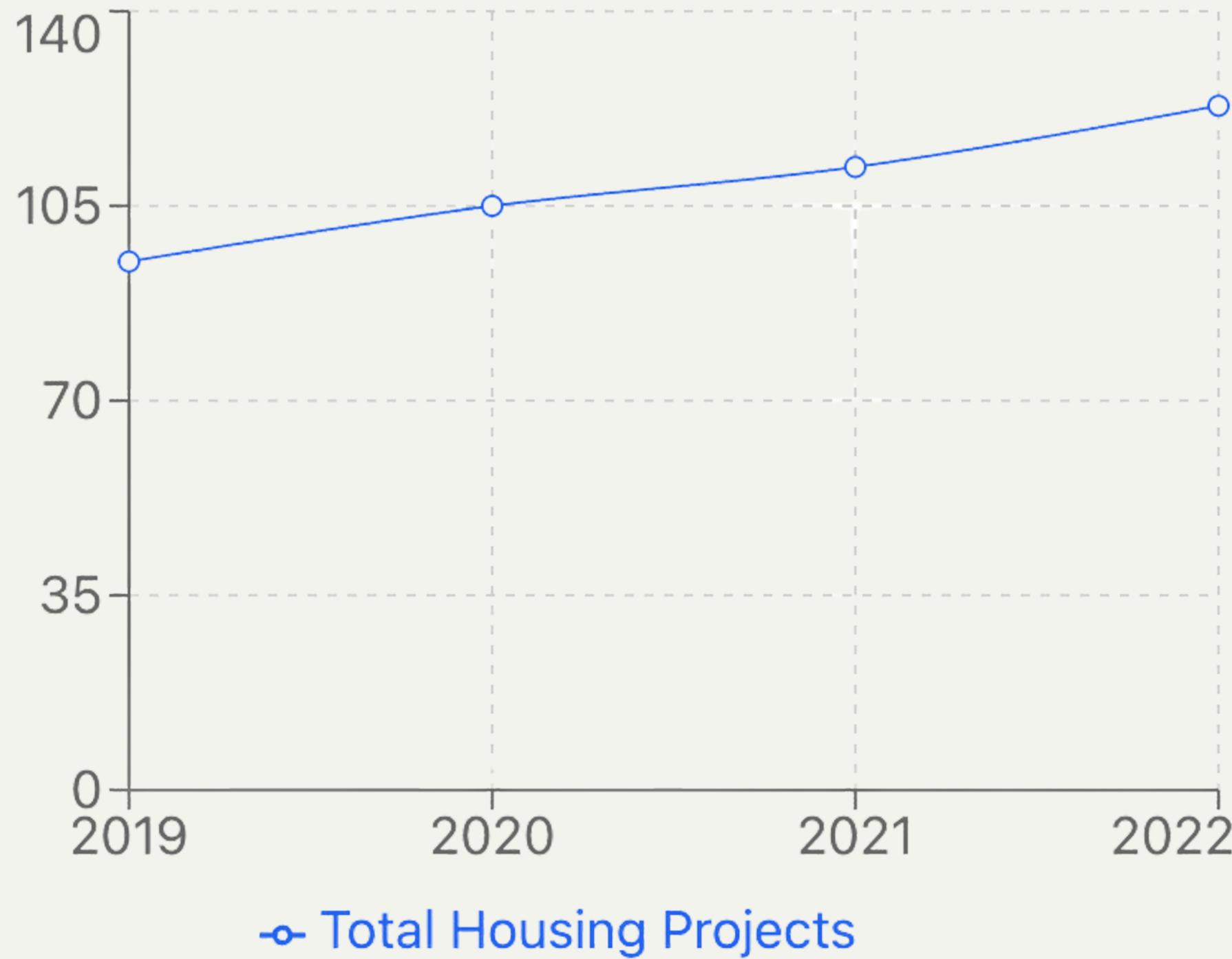
- Government Initiative Context:
  - One Million Houses program (est. 2015)
  - Part of national housing strategy
  - Focus on low-income families (MBR)
- Project Management Challenges:
  - Complex scheduling requirements
  - Resource allocation issues
  - Time management criticality



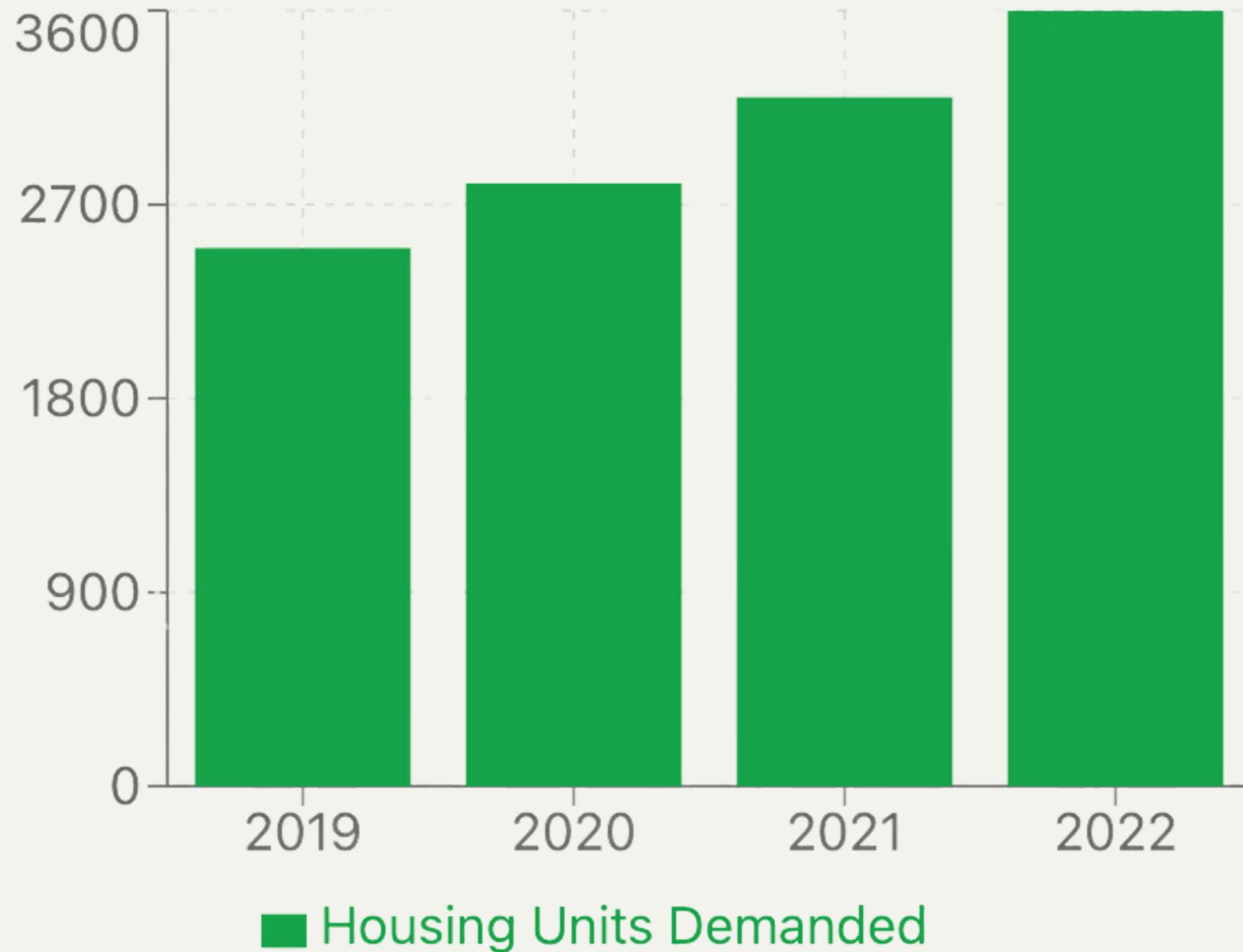
# Housing Distribution in Samarinda City



# Housing Development Timeline



# Housing Demand Growth

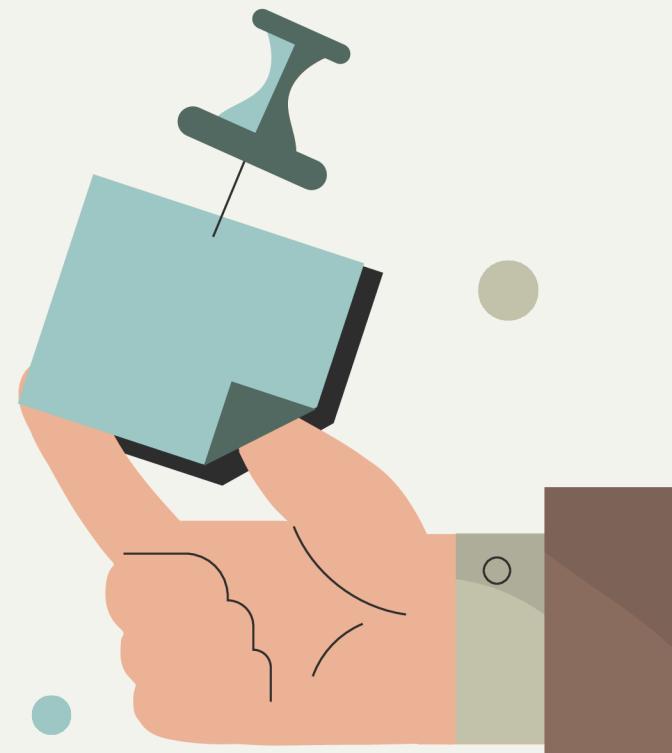


# Problem Statement



## Current Challenges and Research Focus

- Current Scheduling Issues:
  - Traditional methods inadequate
  - Manual scheduling prone to errors
  - No systematic optimization approach
  - Lack of scientific time management





# Problem Statement

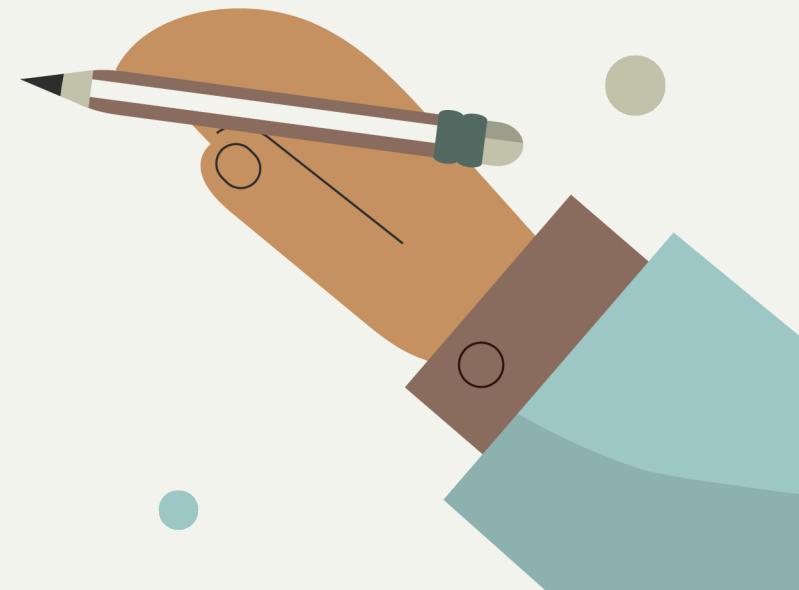
- Impact of Problems:
  - Project delays: Average 15-20% time overrun
  - Cost escalation: 10-30% budget overrun
  - Resource wastage
  - Reduced housing affordability
- Research Questions
  - What are the critical path activities in housing construction?
  - How much time reduction is achievable?
  - What are the cost implications of optimized scheduling?

# Research Motivation & Importance



## Multi-dimensional Impact Analysis

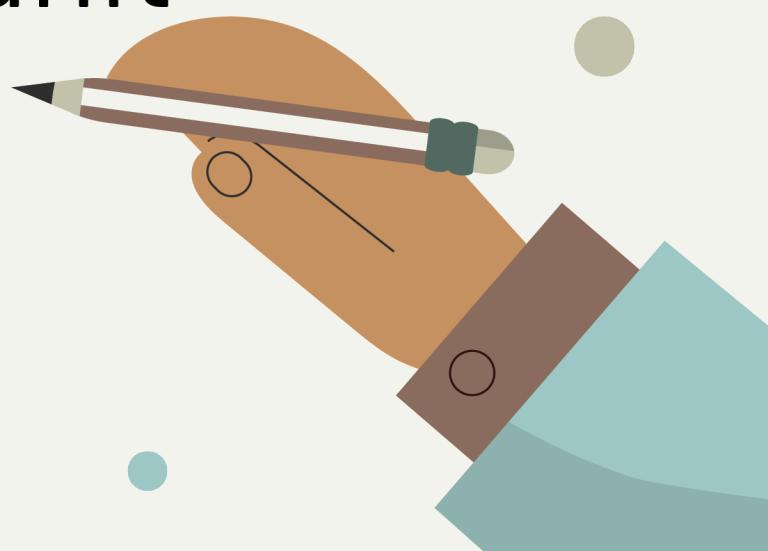
- Economic Impact:
  - Cost reduction potential: 5-15%
  - Better resource utilization
  - Improved cash flow management
  - Enhanced project viability



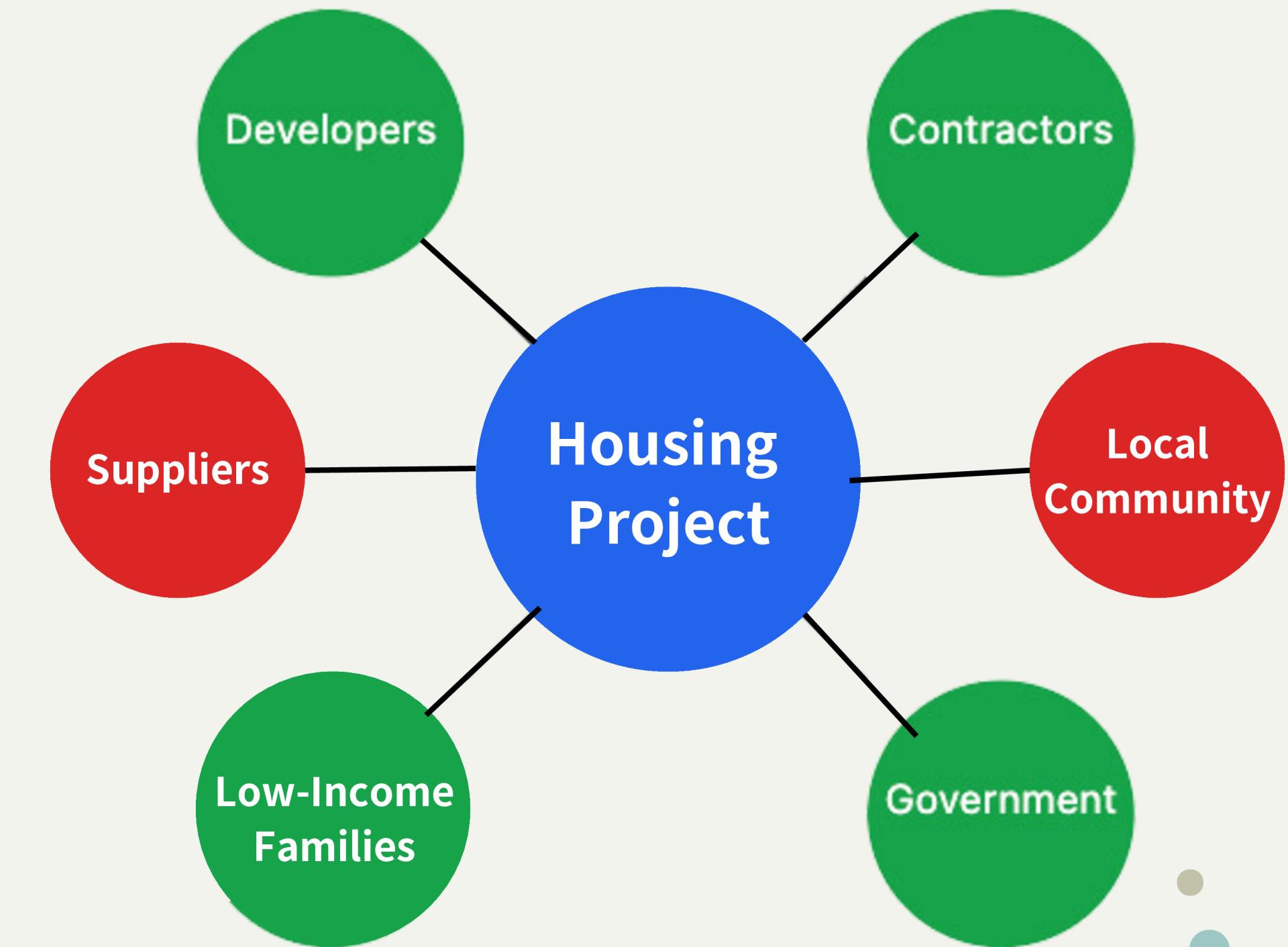
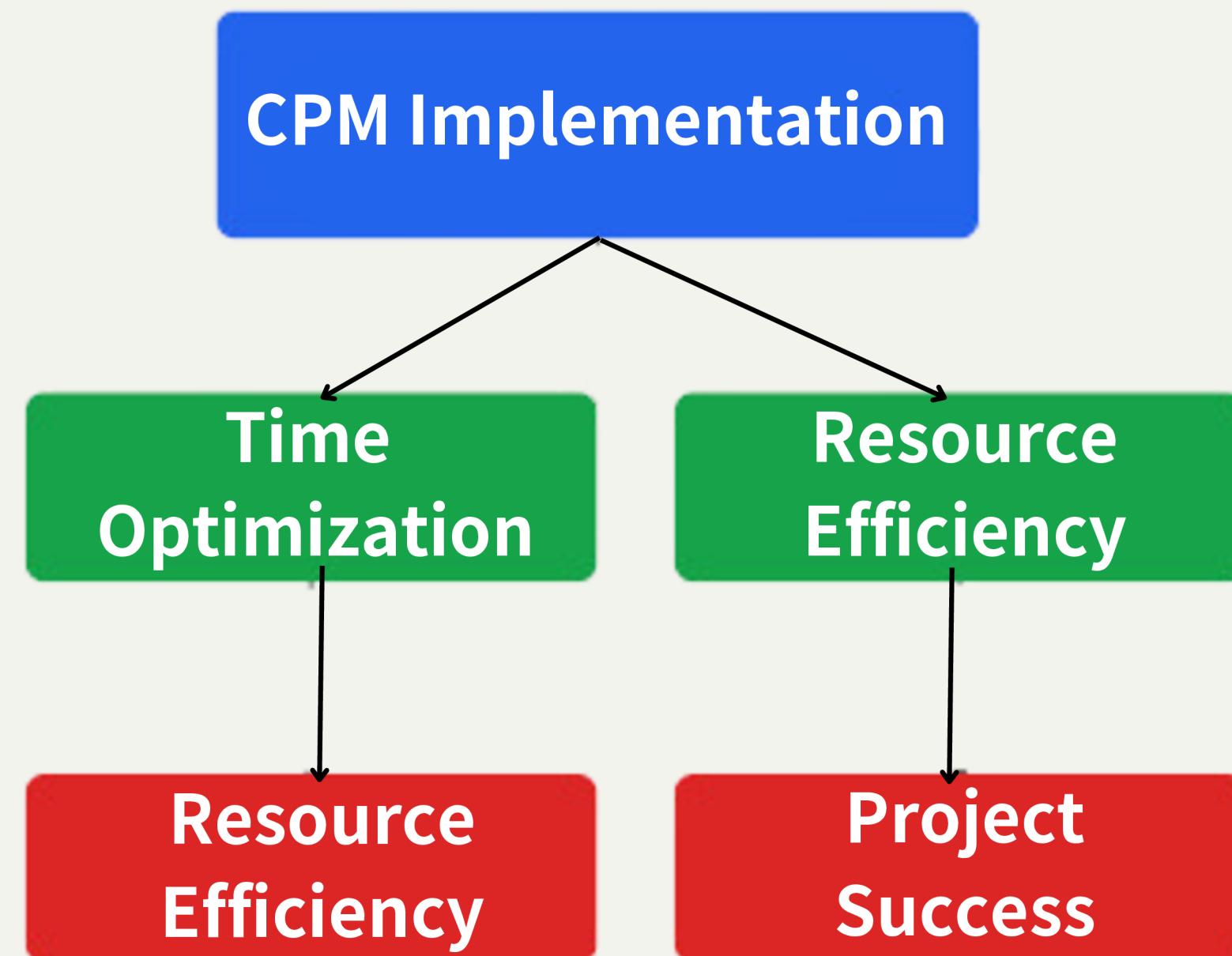


# Research Motivation & Importance

- Industry Benefits:
  - Standardized scheduling methodology
  - Reproducible optimization process
  - Better risk management
  - Enhanced project control
  - Professional development opportunities
- Social Impact:
  - Faster housing delivery: 9+ days saved per unit
  - More affordable housing options
  - Improved living conditions
  - Community development, Social stability



# Benefit Flow Chart & Stakeholder Map





# Literature Review

## Comprehensive Research Foundation

- Project Scheduling Theory:
  - CPM Development (1950s)
  - Modern Applications
  - Time-Cost Trade-off Studies
  - Network Analysis Evolution





# Literature Review

- Housing Development Research:
  - Construction Management
  - Low-cost Housing Techniques
  - Policy Implementation
  - Success Factors
- Previous CPM Applications:
  - Construction Case Studies
  - Optimization Results
  - Implementation Challenges
  - Success Factors



# Research Methods

## Comprehensive Methodology Framework

- Research Design:
  - Mixed method approach
  - Case study: Bukit Mulya Project
  - Duration: 6 months
  - Sample size: 36 housing units
- Analysis Framework:
  - Quantitative: CPM calculations
  - Qualitative: Expert insights
  - Validation: Cross-verification





# Research Methods

- Data Collection Methods:

## Primary

Structured questionnaires  
Field observations  
Expert interviews  
Project documentation

## Secondary

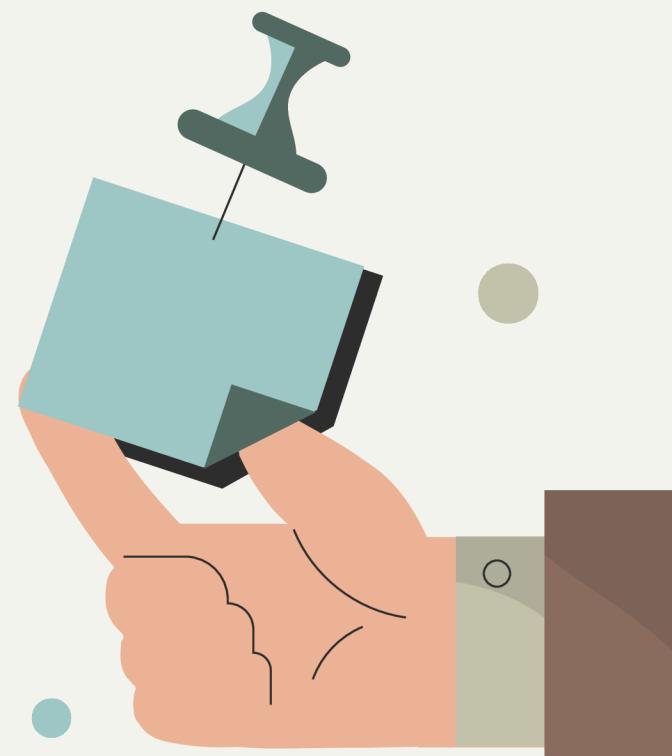
Construction drawings  
Budget plans  
Time schedules  
Industry standards



# CPM Analysis Framework

## Technical Implementation Analysis Steps

- Activity Identification:
  - Work breakdown structure
  - Activity coding
  - Dependency mapping
- Duration Estimation:
  - Historical data analysis
  - Expert consultation
  - Resource consideration





# CPM Analysis Framework

- Network Analysis:
  - Forward pass calculation
  - Backward pass calculation
  - Float determination
  - Critical path identification
- Tools and Software:
  - QM for Windows V5
  - Microsoft Excel
  - Project management software
  - Statistical analysis tools



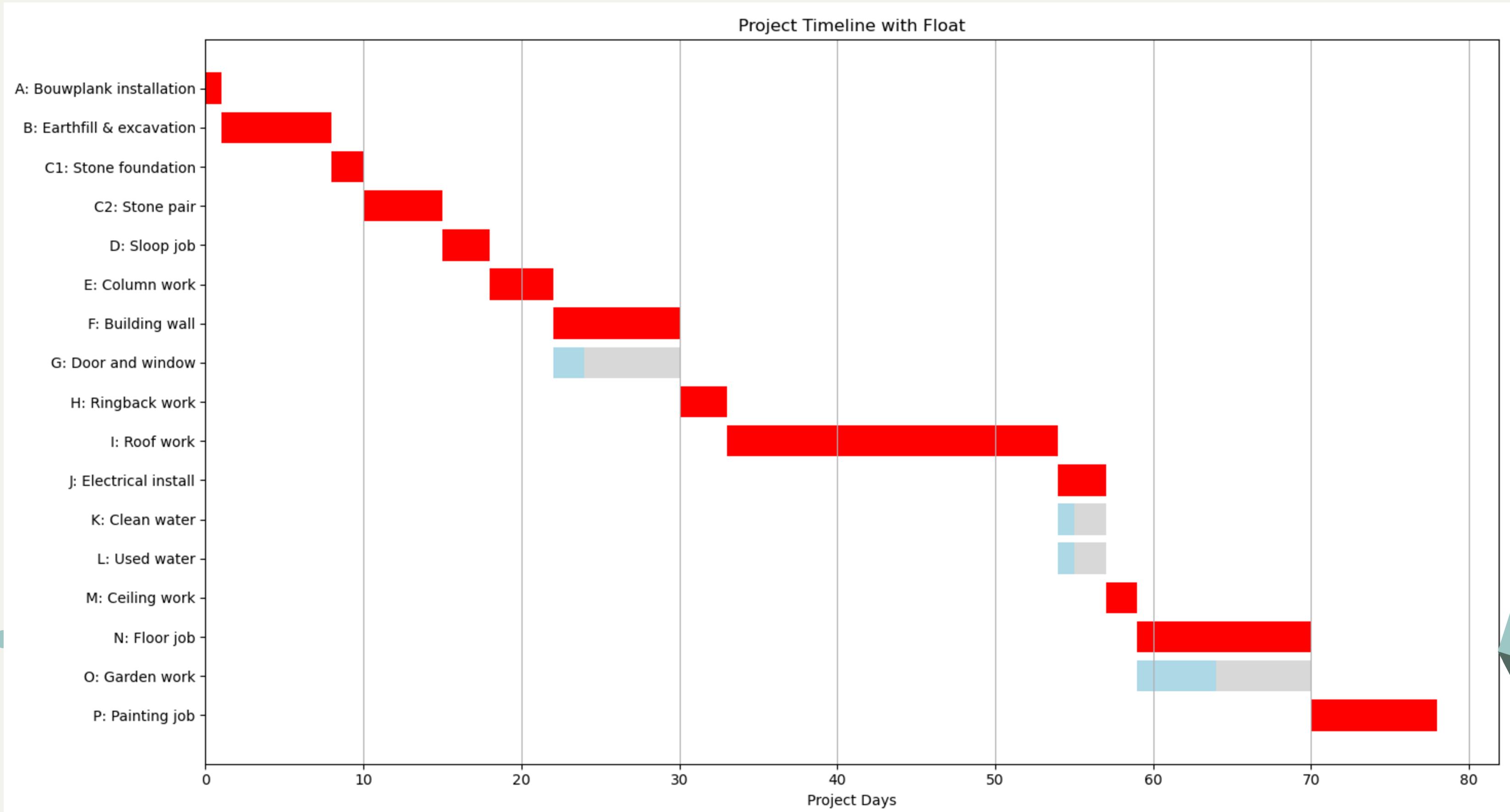
**Table 4** Interrelationships Between Project Work

No.	Work	Activity Code	Prior Activities
1.	Bouwplank installation	A	-
2.	Earthfill & excavation work	B	A
3.	Stone masonry foundation work	C1	B
4.	Stone pair	C2	C1
5.	Sloop job	D	C2
6.	Column work	E	D
7.	Building wall work	F	E
8.	Door and window work	G	E
9.	Ringback work	H	G, F
10.	Roof work	I	H
11.	Electrical installation work	J	I
12.	Clean water works	K	I
13.	Used water & dirty water works	L	I
14.	Ceiling work	M	J, K, L
15.	Floor job	N	M
16.	Garden work	O	M
17.	Painting job	P	O, N

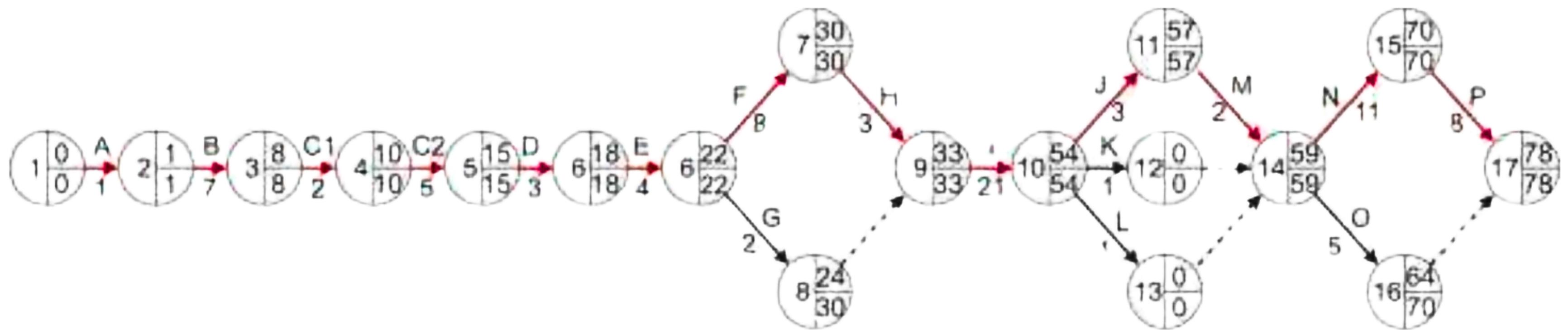
Source: Processed by Researchers (2022)

Prior activities are determined based on the logical construction sequence and technical dependencies of building a house.

# Project Timeline Gantt Chart



# Project CPM Network Diagram



# Expected Outcomes



## Research Deliverables and Benefits

- Technical Deliverables:
  - Optimized project schedule
  - Critical path identification
  - Time reduction analysis
  - Resource optimization plan
  - Implementation guidelines





# Expected Outcomes

- Measurable Benefits:
  - Time reduction: 9+ days per unit
  - Cost savings: 5-15%
  - Resource efficiency: 10-20%
  - Better project control
  - Enhanced decision-making
- Long-term Impact:
  - Industry standardization
  - Knowledge contribution
  - Professional development
  - Social benefit



# In Conclusion

Optimizing construction efficiency today for better housing accessibility tomorrow

- CPM implementation significantly improves construction efficiency
- Enhanced housing accessibility for low-income families
- Foundation for future construction optimization
- Adaptable methodology for various housing projects



# Thanks!

