System Dynamics Modelling to Understand Pendency of Criminal Cases in the Indian Justice System

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1. Introduction

- **Pendency:** time taken to dispose of case
- Over **4.5 crore cases pending** in courts
- Concern is not just stock (undertrial cases) but flow (**case disposal rate**)
- Interconnected actors and components:
  - judges, lawyers, litigants, court employees, infrastructure, legislation
  - various mental models
- Multiple solutions like increasing judge strength may not work in isolation

2. Objectives

- To model key dynamics causing pendency
- Test the impact of proposed interventions
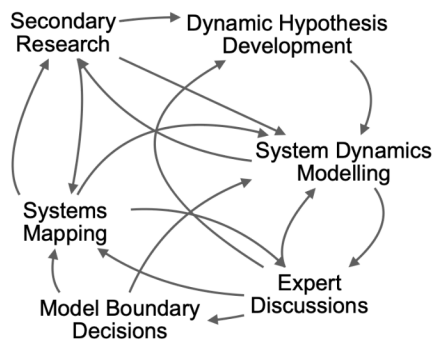
3. Methodology

Fig 1. Research Methodology

Scenarios considered:

1. **Business-as-usual** No intervention
2. **Filling judge vacancies** at once in the beginning of the simulation
3. **Release of minor offenders** (65% cases) at once after two years of simulation start
4. **Joint intervention:** Do both 2 and 3 interventions

4. Linear vs Feedback View of Pendency

Linear view: Institutionalisation and disposal rate do not have any feedback relationship with undertrial cases
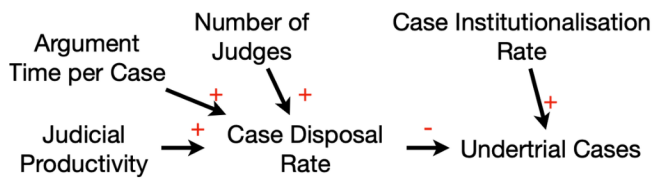

Fig 2. Linear view of pendency (undertrial cases)

Feedback view: Institutionalisation and disposal rate both have feedback relationship with undertrial cases

Feedback 1 - Context Switching

- Context switching cost during transition between cases
- Switching cost reduces productivity and disposal rate

Feedback 2 - Repeat Arrest

- Pending case results in more time spent in jail
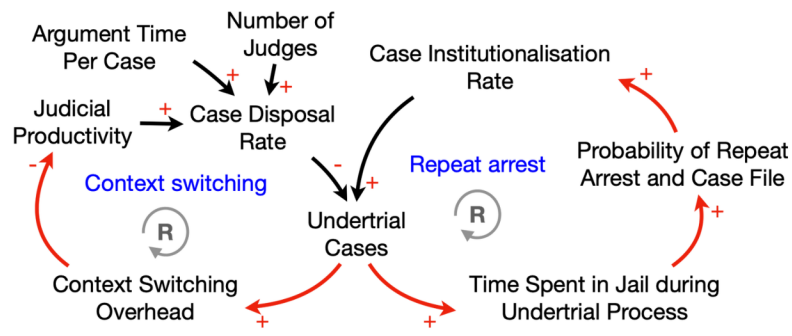- Police suspect ex-undertrials to be the offenders in any new crime even if they did not commit the crime

Fig 3. Feedback view of pendency

- Two mutually reinforcing feedback loops will aggravate pending cases
- Pendency need to be analysed carefully, to avoid snowball effect
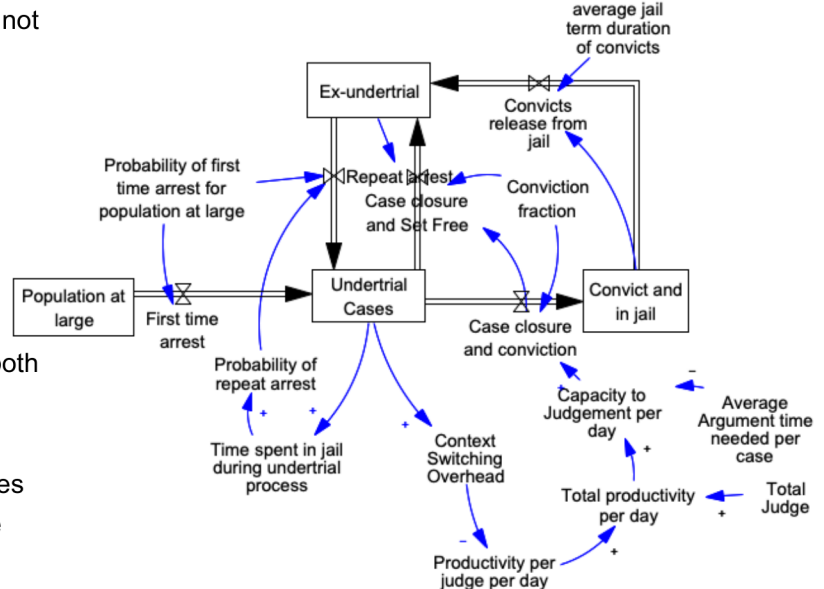
5. Stock-flow Model

Fig 4. Stock-flow model of pendency (considering Fig. 3)

No. of undertrials after five years compared to initial value		
Scenarios/Models	Linear	Feedback
Business-as-usual (BAU)	1.3x	1.68x
Filling judges vacancies	0.76x	**1.20x**
Release of minor offenders	0.66x	0.97x
Joint intervention	0.11x	**0.48x**

Table 1. Scenario analysis results

6. Conclusion

- Due to feedback effect higher rate of change of cases, risk of underestimating the quantum of the problem
- Filing judge vacancies alone will not significantly reduce the pendency
- Feedback-induced nonlinearity is important while making decisions for interventions to be effective