
НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ УНИВЕРСИТЕТ

MIEM HSE University

# OPTIMAL CONTROL OF REQUESTS ACCEPTANCE IN THE G|M|n|oo QUEUING SYSTEM WITH IMPATIENT CUSTOMERS TO MINIMIZE THE PAYBACK PERIOD

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Moscow, 2021

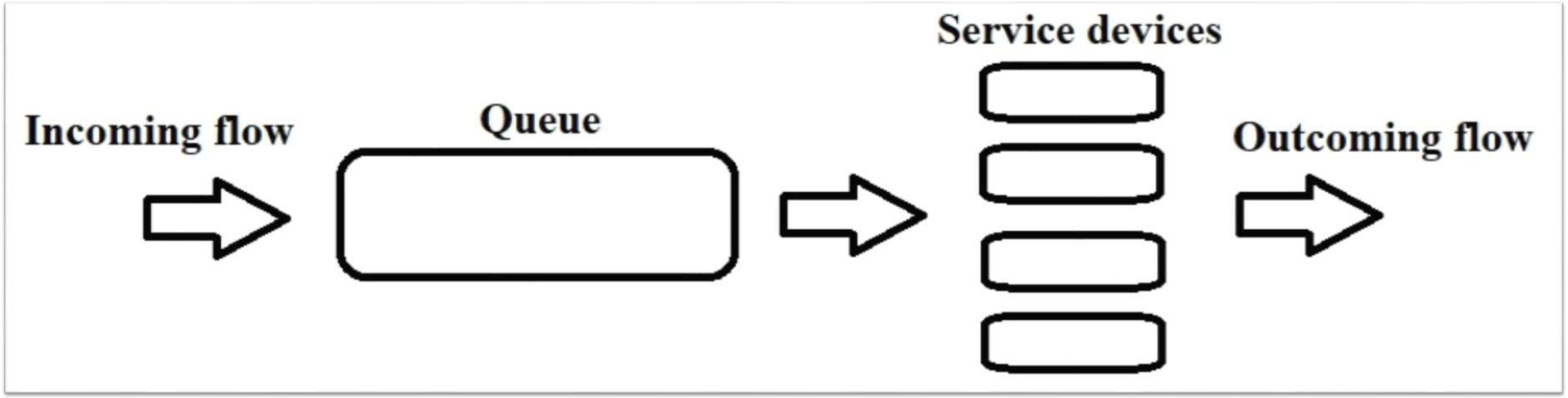
# Relevance


Bank

Barbershop

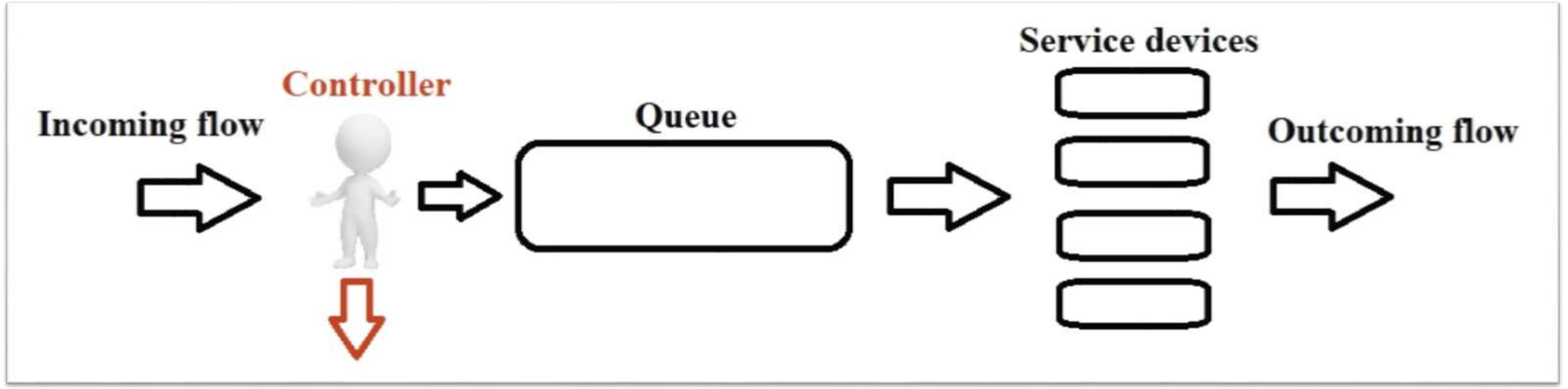
Supermarket

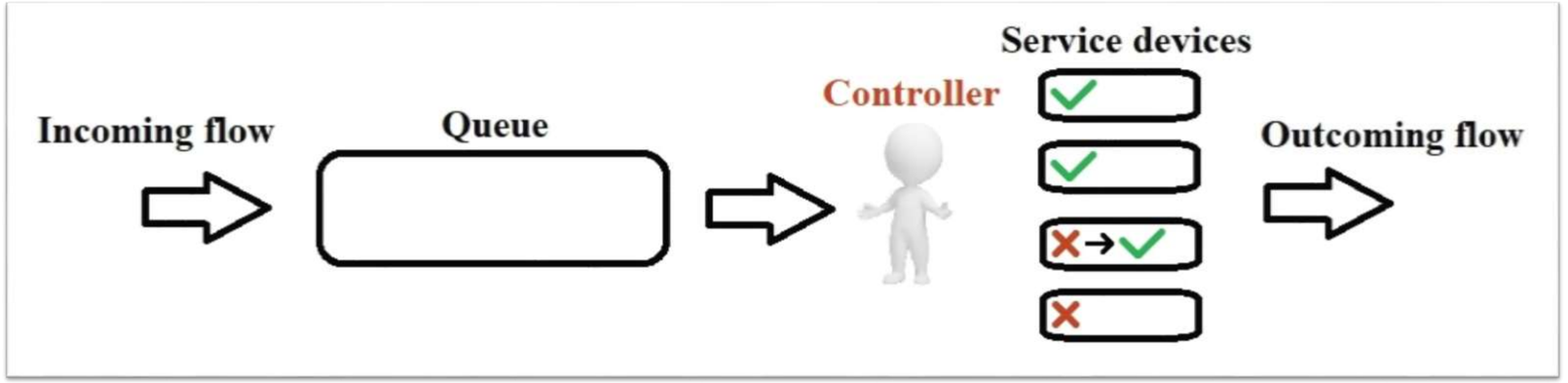
# Problem statement




Queuing system model

# Problem statement



# Purpose

**G|M|n|oo queuing system with impatient customers:**

G – incoming flow of requests

M – service process

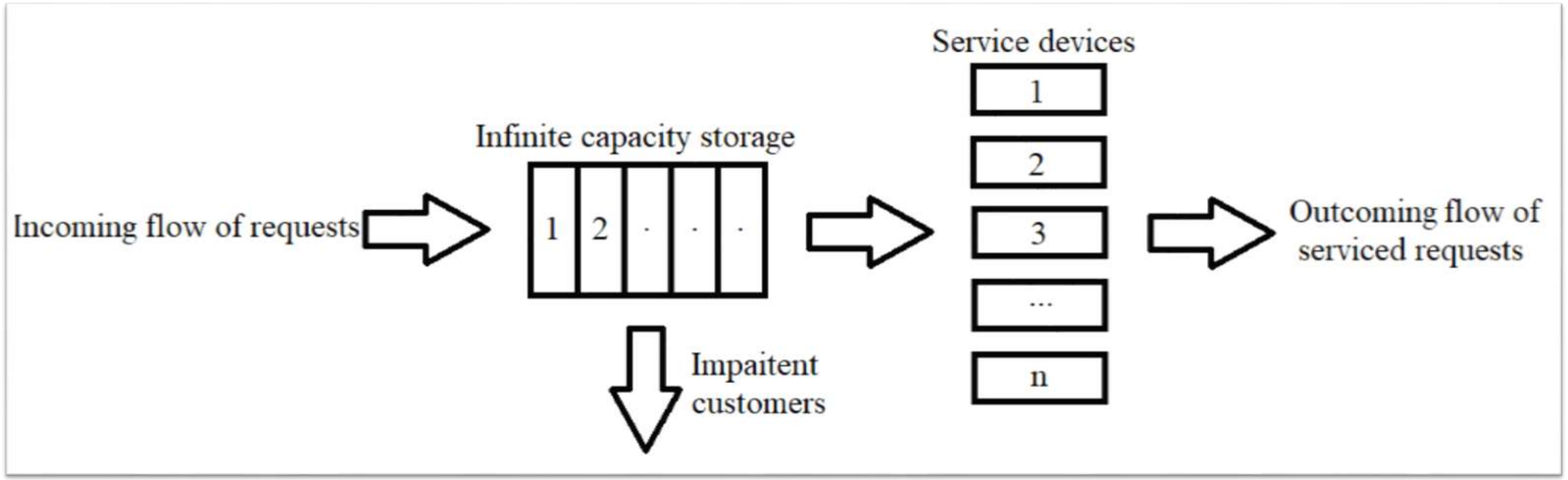
n – number of service devices

oo – storage capacity

μ – intensity of service

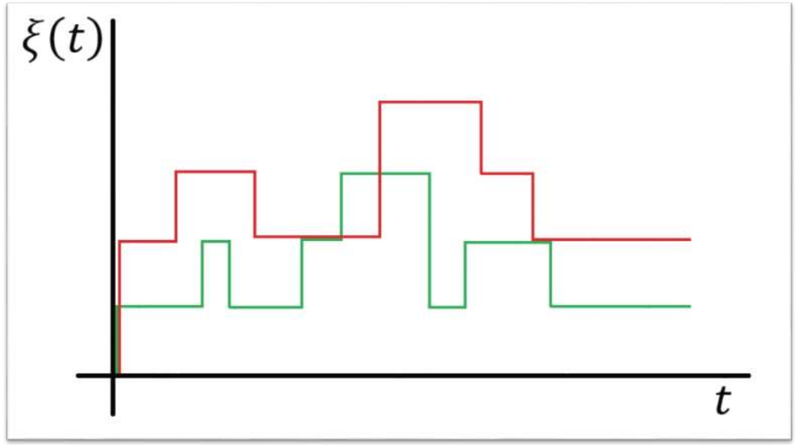
γ – intensity of impatient customers

$p_v$ – the probability of acceptance

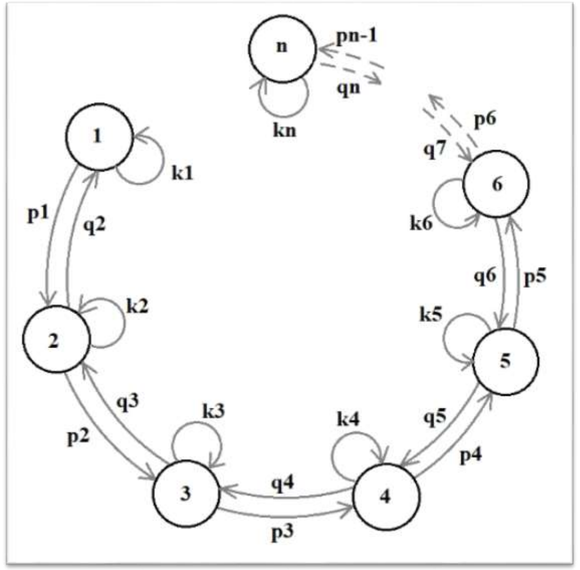



Model

# Methods




Stochastic processes



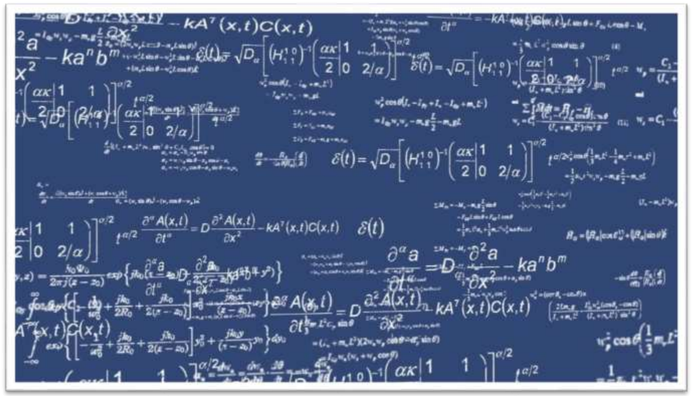

Markov chains


Simulation modeling

# Methods

1. **Stochastic process** $\xi(t)$.

2. Sequence $\xi_n = \xi(t_n)$ forms a **nested Markov chain.**



$W(t)$ functional is the profit. Random variable $\eta$ is the time to receive income $S$ :

$$\eta = min(t \mid W(t) = S).$$

Conditional mathematical expectation of the variable $\eta$ :

$$L_{i_0} = E(\eta \mid \xi(0) = i_0).$$

**The optimization problem** :

$$L_0 = E(\eta \mid \xi(0) = 0) \to \min_{p_v}.$$

3. Simulation modeling.

## Anticipated results

1. Solved optimization problem.
2. Optimal control strategy.
3. Constructed simulation model.


## Conclusion


Investigations


Real systems

# References

[1] S. Karlin. 1968. «A first course in stochastic processes». – New York and London: Academic press. 502p.

[2] E. Nummelin. 1984, 2004. «General irreducible Markov chains and non-negative operators». – Cambridge University Press. 156p.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# Thank you for your attention

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