

# How Much Does an i-Vote Cost?

Cost Comparison per Vote in Multichannel Elections in Estonia

Tallinn University of Technology

Ragnar Nurkse Department of Innovation and Governance

Prof. Dr. Robert Krimmer, Dr. David Duenas, Iuliia Krivonosova

Dr. Priit Vinkel, Arne Koitmae



## Main goal

Present the methodology followed in the project **CoDE (Cost of Democratic Elections)** to calculate the costs per vote of different voting channels in the Estonian Local Elections (2017).



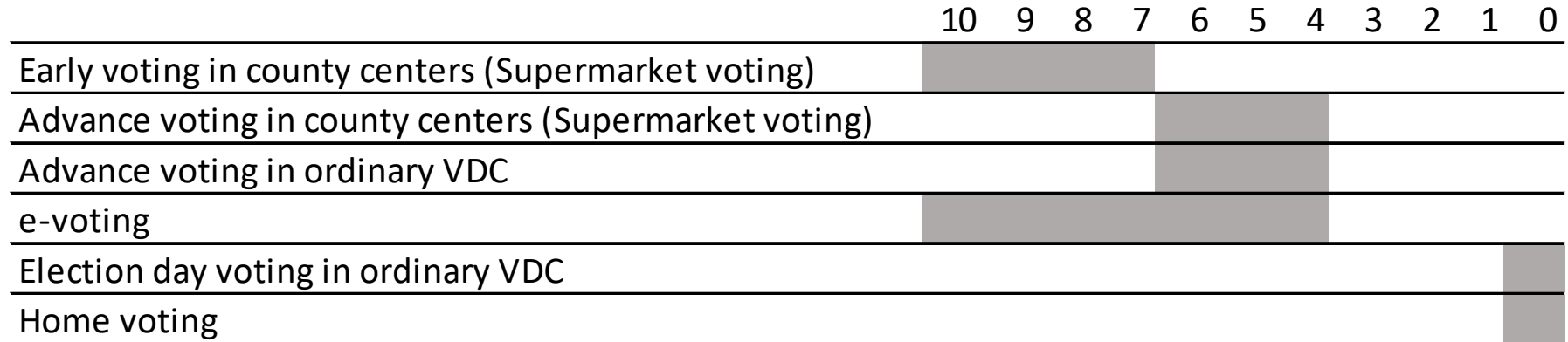
## Why this research?

- The impact assessment of I-voting is mainly focused on a user side (usability, costs)
- Lack of research analyzing the costs of the implementation of I-voting from the election administration side.
- Demand for such research from a governmental side, i-vote cost-efficiency calculation can help governments to make more informed decisions about whether to introduce/keep i-vote.



## Why Estonia?

- Small Country → Affordable fieldwork
- The e-dimension → No e-, no fun
- The Electoral Structure





## Difficulties detected on previous researches

- Lack of data or access to data even in the most democratic countries.
- Lack of effective methodology. Previous scholars addressed the topic by focusing on electoral budgets provided by the Electoral Management Bodies (EMBs):
  - a) Budgets do not allow to detect hidden costs
  - b) Some costs could be not allocated to the election organization at all since elections utilize greatly from the public infrastructure.



# Methodology

We propose a combined use of :

- Business Process Reengineering (BPR) (Attaran, 2004)
- Activity-Based Costing (ABC) (Babad & Balachandran, 1993), in particular, the use of Time-Driven ABC (TD-ABC) (Kaplan & Anderson, 2007).



## 9 Steps

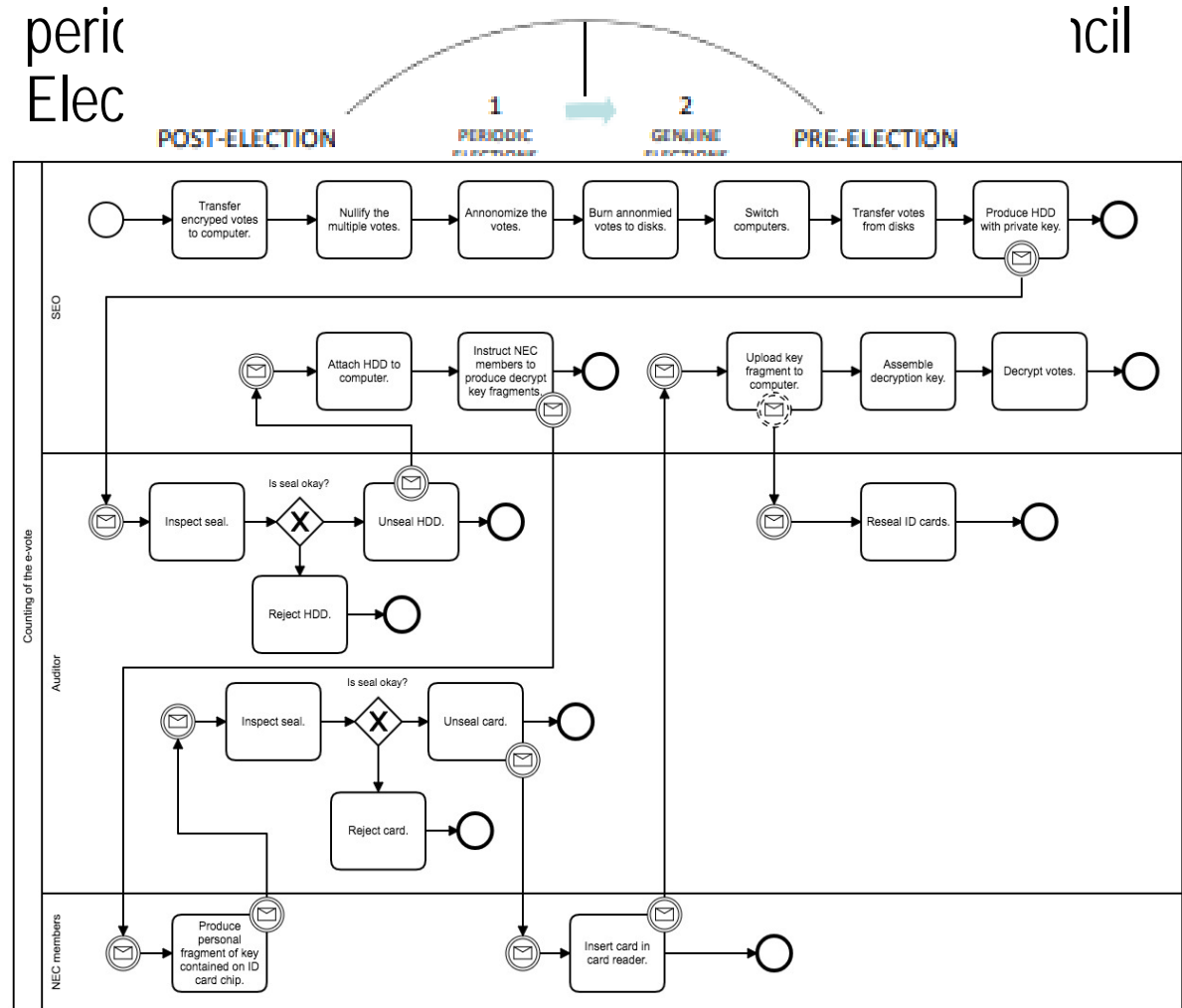
- Electoral Process Modelling
- Interviews and OnSite Observations
- Listing Activities
- Identification of Resource Pools
- Attribution of costs to activities
- Practical capacities of resources
- Cost per minute per activity
- Cost per ballot per voting channel
- Cost comparison



# Electoral Process Modelling

*Detect and understand the potential sources of expense and the different activities that are involved in every process.*

- Narrowing down the electoral process
- Modelling the processes occurring in this time







## Interviews and OnSite observations

*Collect real data regarding the number of people and time needed to conduct certain activities and the number of times certain activities are occurring.*

- Interviews and on-site interviews with 1) EMBs, before the Elections, and 2) polling staff members, during the elections.
- On-site observations during the Electoral Period in 1) different places and 2) different moments.



## Listing activities

- Listing the activities detected for every process during the modelling.

*Make a distinction between those activities that have **the same impact** in every voting channel, not incurring in cost differences, and those that are **organized differently** depending on the voting channel.*



# Identification of Resource Pools

- Detection of resource pools to which costs can be allocated. Six main elements were listed:
  - Wages
  - Depreciation
  - Transportation
  - Renting
  - Printing
  - Stationery costs

| TRANSPORTATION COSTS for County Centers (early, Advance and Election Day Voting) |  |                                  |  |              |          |
|--|--|----------------------------------|--|--------------|----------|
| Process N°   | Activity   | Description                      | Frequency/Voting Channel attribution               | Price per km | Distance |
| 1  | Delivery of Equipment                                  | By 2017 standard<br>0,15€ per km | Once per election; early, advance and election day | 0,15         | 7.806,40 |
| 4  | Voter Identification at voters' location (home voting) |                                  | Only for election day voting                       |              | 840      |
| 5  | Procession of advance votes from outside               |                                  | Early and advance voting                           |              | 7.806,40 |
| 7  | Ballots' transportation for recounting                 |                                  | Once per election; early, advance and election day |              | 840      |

## Attribution of costs to activities

- Costs are **directly attributed** to activities when it is possible due to precise data availability. When it is not possible, they are calculated by **multiplying the time** that a certain activity involves (in minutes) **by the wage** per minute of those in charge of this activity.

*Calculate the total cost involved in the development of a certain activity*

| Activity   | Description  | Frequency / Voting Channel Attribution                   | Total time in minutes per activity per all VDC's | Wage in Euro per minute (tax incl.) | Labour cost for employee for all VDC's |
|--|--|--|--|-------------------------------------|--|
| Delivery of Equipment                                  | One member per VDC to deliver equipment                                    | Once per lection; early, advance and election day voting | 6.720  | 0,16                                | 1.081,96                               |
| Stamping Ballots before voting                         | One person per VDC to stamp ballots  |  | 1.132  | 0,16                                | 182,31                                 |
| Setting the voting place (voting booths, ballot boxes) | One person per VDC comes one day before the voting to set the voting place |  | 3.360  | 0,16                                | 540,98                                 |



## Practical capacities of resources

*More accurate calculation of final costs (practical time, not theoretical one).*

- Practical capacity: the level of output that a person can develop under normal conditions, assuming a certain amount of inefficiency.
- We set the practical capacity at 80% of the theoretical full capacity.



- Total cost per activity / Practical capacity (minutes)

## Cost per minute per activity

|  | Election Day Voting | Early Voting | Advance Voting |
|--|---------------------|--------------|----------------|
| Delivery of Equipment                  | 0,26                | 0,48         | 0,54           |
| Stamping ballots                       | 0,23                | 0,26         | 0,91           |
| Setting the voting place               | 0,23                | 0,26         | 0,91           |
| Voter identification – Chairperson     | 0,21                | 0,34         | 0,62           |
| Voter identification – VDC members     | 0,48                | 0,26         | 1,86           |
| Counting of ballots                    | 0,23                | 0,26         | 0,91           |
| Ballots' transportation for recounting | 0,38                | 0,40         | 0,96           |
| Recounting                             | 0,23                | 0,26         | 0,91           |



## Cost per ballot per voting channel

- Time spent on every activity / Number of ballots casted in a certain voting channel = *time per ballot*
- Time that each activity involves x Cost per minute per activity = *cost per activity per ballot*
- Add the costs of every activity involved the “production” of a ballot in a certain voting channel in order to obtain the final *cost per ballot* in a certain voting channel.



# Cost comparison

| Voting Channel                        | Cost per ballot (€) |
|---------------------------------------|---------------------|
| Early voting in County Centers        | 5,07                |
| Advance voting in County Centers      | 6,24                |
| Election Day Voting in County Centers | 4,61                |
| Advance Voting in ordinary VDC        | 20,41               |
| Election Day Voting in ordinary VDC   | 4,37                |
| I-Voting                              | 2,32                |





## Strengths and weaknesses

- The proposed TD ABC methodology allows to:
  - Assess administrative costs of elections in a more precise way
  - Allocate electoral costs to voting channels more accurately than just dividing the sum spent on a voting channel by a number of ballots cast.
  - Make inter-voting channel comparisons.
- Limitations:
  - Field work and observation needs to be improved
  - Need to find more precise data to avoid estimations



## Summary of results

The results presented are the first outcomes of the use of a new methodology for cost calculation of multichannel elections, there is room for improvement in relation with: 1) the process of collection of data and 2) the management of assumption

Our research highlights that:

- 1) **i-vote is the most cost efficient voting channel in cost per voter**, followed by Election Day Voting. Advance Voting in Ordinary VCD is by far the less cost efficient channel
- 2) Costs per vote are **correlated with resources invested** and the **popularity** of the voting channel
- 3) **TDABC** seems to be a **good methodology** for cost calculation of multichannel elections



## References

- Attaran, M.: Exploring the relationship between information technology and business process reengineering. *Inf. Manag.* 41, 5, 585–596 (2004).
- Babad, Y.M., Balachandran, B. V.: Cost driver optimization in activity-based costing. *Account. Rev.* 68, 3, 563–575 (1993).
- Kaplan, R.S., Anderson, S.R.: Time-driven activity-based costing: a simpler and more powerful path to higher profits. *Harvard Bus. Sch. Press Books.* 82, 266 (2007).



## Q&A

# Thanks for your attention

Robert Krimmer

robert.krimmer@ttu.ee

David Duenas-Cid

David.duenas@ttu.ee

Iuliia Krivonosova

iuliia.krivonosova@ttu.ee

Ragnar Nurkse Department of Innovation and Governance  
Tallinn University of Technology