SOUND CALCULATION SIMULATION SYSTEM FOR DISTRIBUTION OF CHAIR PARLIAMENT USING HARE QUOTA AND SAINTE LAGUE METHODS

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ABSTRACT

The conversion of the ballot for the division of parliamentary seats has become one of the historical points in the development of the democratic order in Indonesia. How not, through a plenary session, the DPR RI finally finalizes the discussion and decision making on the Election Bill proposed by the government. Conversion of votes is one of the crucial issues to get the word consensus in the House of Representatives, because the method of voting conversion used will greatly determine the acquisition of seats for a political party. For example, if using the quota method, a party can get 5 seats, but it is not certain if the calculation method uses the Sainte Lague method, it could be that one party will get 4 to 6 seats. That is why the voting conversion method is one of the main variables of an electoral system.

The method of converting votes is the procedure for calculating the results of elections to determine the acquisition of seats for political parties in representative institutions based on the results of the acquisition of valid votes of each political party participating in the election. The Hare Quota method is characterized by a calculation method using the Number of Voters Dividers (BPP) which divides the total number of valid voting votes by the number of seats allocated to one particular constituency, and always has the remaining choice of votes that requires calculation at the next stage for the remaining votes of choice / residual the chair is the Sainte Lague method (the remaining votes are voted on).

Keywords: *Decision Support System, Parliamentary Chair Calculation Simulation, Hare Quota, Sainte Lague*

I. INTRODUCTION

1.1 Background Research

The conversion of the ballot for the division of parliamentary seats has become one of the historical points in the development of the democratic order in Indonesia. How not, through a plenary session, the DPR RI finally finalizes the discussion and decision making on the Election Bill proposed by the government. Conversion of the ballot election becomes one of the crucial issues to obtain consensus in the Indonesian Parliament, because the method of voting conversion will greatly determine the acquisition of seats for a political party. For example, if using the quota method, a party can get 5 seats, but it is not certain if the calculation method uses the Sainte Lague Divisor method, it could be that one party will get 4 to 6 seats. That is why the voting conversion method is one of the main variables of an electoral system.

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Based on the description above, then in this thesis the authors conducted a study to apply the **"SOUND CALCULATION SIMULATION SYSTEM FOR DISTRIBUTION OF PARLIENT CHAIR USING HARE QUOTA AND SAINTE LAGUE METHODS"**.

II. BASIC THEORY

2.1. Hare Quota Method *(Hare Quota*

In accordance with its name Hare Quota, this method was formulated by Sir Thomas Hare (1806-1891), a British legal expert, who in his lifetime was interested in reforming the electoral system in his country. This method was formulated with the intention of creating an electoral system that could create proportional results for each group. The Hare Quota method is applied in a number of countries such as Austria, the Philippines, Mexico, Italy, South Korea and several countries in the African region.

2.2. Sainte Lague Method

The *Sainte Lague* method, (French pronunciation: [sɛt.la.ɡy]), is the method with the highest seat price for allocating seats in proportional representation of party lists used in many voting systems. It is named in Europe after the French mathematician André Sainte-Laguë and in the United States after statesman and senator Daniel Webster.

Sainte Lague was first used in 1832 and 1842, this method was adopted for the allocation of proportional seats in parts of the United States congress (Act of June 25, 1842, ch 46, 5 Stat. 491). Then reintroduced in France by André Sainte-Laguë in his article in 1910. It seems that French and European literature did not recognize this method

2.3. Decision Support System

The meaning of the decision support system proposed by Michael S Scott Morton and Peter G. Keen, in the book Management Information System [1] states that the support system is a system of producing information that is raised on problems that must be made by managers.

According to Keen and Scott in the book Management Information Systems [1] the goals of a decision support system are:

A. Help managers make decisions to solve semi-structured problems.
B. Supports manager's judgment rather than trying to replace it.
C. Increase the effectiveness of managerial decision-making rather than efficiency.

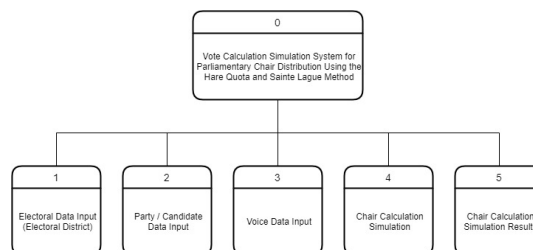## III. SYSTEM DESIGN

3.1. *Diverse* Diagram

Figure 1. *Tiered Diagram.*

In the tiered diagram above explained that level two is a picture of level 0, level one is level 1.
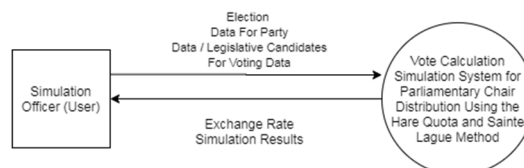

Figure 2. *Display Data Flow Diagram Level 0.*

Explanation of DFD level 0 images is as follows:

A. The simulation officer input data (electoral district, party or legislative candidate and vote).
B. Then in the next process run by a simulation system to do the sound calculation process.
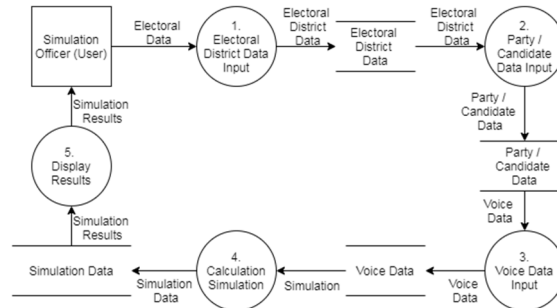C. End with the simulation results of the seat calculation to the simulation officer.

Figure 3. Display Data Flow Diagram Level 1.

Explanation of DFD level 1 images is as follows:

A. The simulation officer input data on the electoral district (electoral district).

B. Simulation officers input party / candidate data.

C. The simulation officer inputs voice data.

D. Then from these data a simulation of seat calculation is done by the system.

E. Displaying the simulation results of the seat calculation using the Hare Quota or Sainte Lague method.

3.2 Interface Design

Based on the analysis of the system that has been done, the interface display made is as follows :

Figure 4. Login Form Design.

The design of the user login form is used to input the simulation system operator username and password.

Figure 5. Draft Party Data Form

The draft party data form is used to add or edit party data. This form consists of inputting party names, party serial numbers, party profiles, party abbreviations, and party photos.
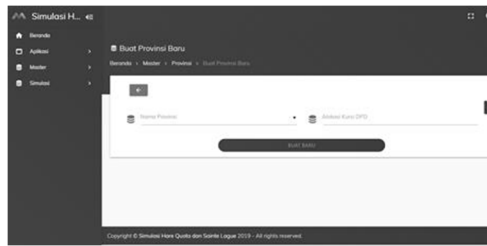
Figure 6. *Provincial Data Form Design*

The draft provincial data form is used to add or edit provincial data. This form consists of inputting the name of the province, and the allocation of DPD seats.
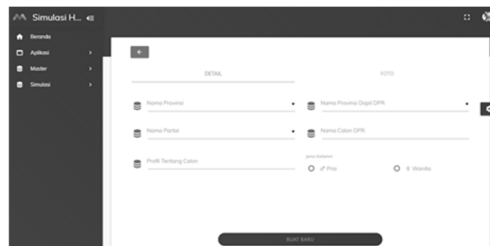

Figure 7. *Draft List Form Data for Permanent Candidates*

The draft candidate list data form is still used to add or edit the DPR, DPD, Provincial DPRD and Regency DPRD permanent candidate list data. This form consists of inputting the name of the province, electoral name, party name, candidate name, candidate profile, sex of the candidate, and photo of the candidate.

IV. IMPLEMENTATION AND TRIAL
4.1. Implementation

The simulation of determining seat acquisition in this final project uses the Hare Quota and Sainte Lague method.

System flowchart (system flowchart) is a part that explains in detail the steps of the system process. The system flow section is created from the derification of the program flow section. The flow of implementation can be seen in the flowchart below:
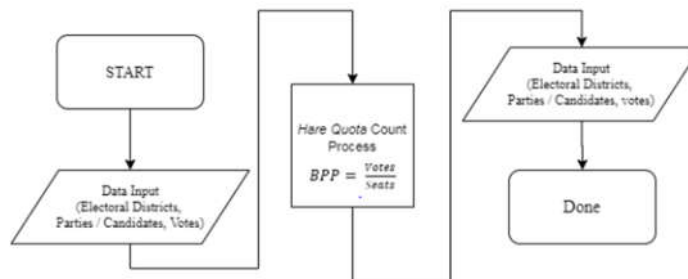

Figure 8. Hare Quota Flowchart and Sainte Lague

The system starts when the officer logs in, then the officer can make changes to party data, party candidate data, provincial data, and electoral data. In addition, officers can carry out a process of simulating the acquisition of party seats.
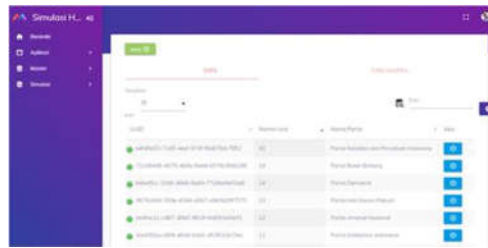
Examples of system implementation are as follows:
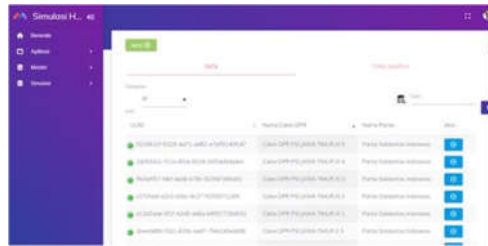
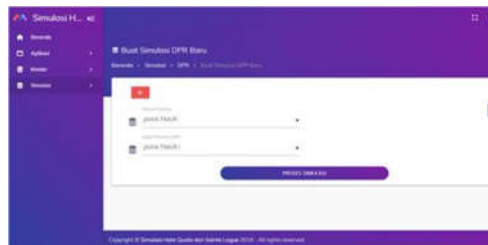*Figure 9. Party data*

Figure 10. Fixed Candidate Data
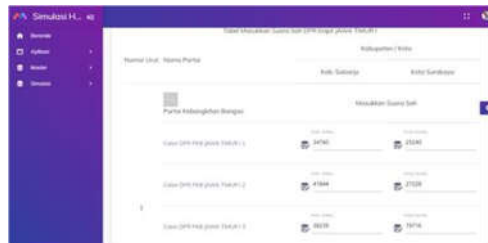

Figure 11 Input District Selection

Figure 12. Valid Voice Data Input
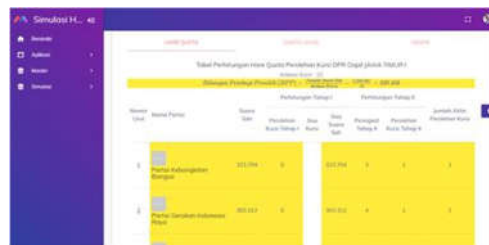
4.2. TRIAL TEST RESULTS

Figure 13. Hare Quota and Sainte Lague Simulation Result

Party Sort Number	Party Name	Legitimate Sound	Voice Acquisition of Chairs (Hare Quota)	Voice Acquisition of Chairs (Hare Quota)
1	Partai Kebangkitan Bangsa (PKB)	323.704	1	1
2	Gerakan Indonesia Raya (Gerindra)	303.312	1	1
3	Partai Demokrasi Indonesia Perjuangan (PDIP)	257.868	1	1
4	Partai Golongan Karya (GOLKAR)	201.342	0	0
5	Partai Nasdem	160.152	0	0
6	Partai Gerakan Perubahan Indonesia (GARUDA)	236.040	1	1
7	Partai Berkarya	103.709	0	0
8	Partai Keadilan Sejahtera (PKS)	366.856	1	1
9	Partai Kesatuan Indonesia (Perindo)	171.360	0	0
10	Partai Persatuan Indonesia (PPP)	429.928	1	1

11	Partai Solidaritas Indonesia (PSI)	222.357	0	0
12	Partai Amat Nasioanl (PAN)	477.460	1	1
13	Partai Hati Nurani Rakyat (Hanura)	332.002	1	1
14	Partai Demokrat	128.127	0	0
19	Partai Bulan Bintang (PBB)	225.401	1	1
20	Partai Keadilan dan Persatuan Indonesia	291.943	1	1
Number of Seats Allocation			10	10

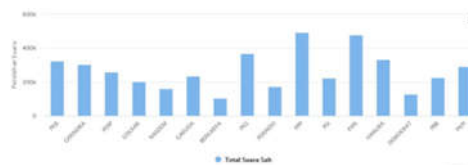*Table 1. Comparison Results of Hare Quota and Sainte Lague*

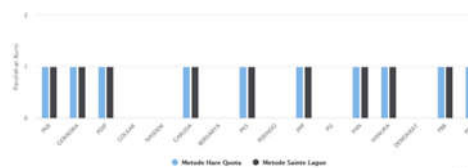*Figure 14. Graphic Results of Legitimate Party Voting Results*

Figure 15. Graph of Comparison of Hare Quota and Sainte Lague Chair Results

V. CONCLUSIONS

The final project in this book entitled "Vote Calculation Simulation System for the Distribution of Parliamentary Chairs Using the Hare Quota and Sainte Lague Method" aims to implement and create a simulation system using the Hare Quota and Sainte Lague method to count the number of seats obtained based on the number of votes for each party. Based on the results of the program output, the following conclusions can be drawn:

A. This research has succeeded, producing a simulation system that is used to count the number of seats obtained by the party based on the input of votes of each party.

B. Based on the trial results it was found that the Hare Quota method cannot divide the average seats for the party because it is calculated based on the most votes, while the Sainte Lague method can divide evenly and fairly because it is calculated based on rotation.

C. Comparison of applications with KPU data is not too far, because the data entered is based on KPU rules.

VI. SUGGESTION

The design and manufacture of this application system still requires further observation and development. The advice needed is as follows:

A. It is expected that in future studies the use of the PHP programming language can be optimized.

B. This application needs to be applied for the simulation of the upcoming election calculations.

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