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By

Prof. Yoshiaki Kobayashi

Professor

Department of Law and Political Science,

Keio University

Information Technology’s Role in Democracy

Yoshiaki Kobayashi (Professor, Faculty of Law, Keio University)

1. The Concept of Democracy

In a representative democracy, such as the one we have in Japan, an election gives the constituency an opportunity to express their support, or lack thereof, for the platforms and policies proposed by parties and candidates. Particularly with Japan’s parliamentary–cabinet system, which appoints the prime minister without the input of the constituency and without a national election, it is no exaggeration to say that the election is the only opportunity afforded the constituency to express their will. The parties and candidates thus elected and entrusted with the will of the people are then expected to set policy and create a budget. This feedback to the constituency is what is normally expected in a democratic society.

This concept of democracy assumes perfect information between constituents, parties and candidates. It requires that the policies and proposals of each party and candidate are fully communicated to every member of the constituency, and that the intention of each constituent is properly communicated to the parliament. It also requires that the decision of the constituents is properly reflected in the results.

In reality, however, the system does not function exactly as expected. For example, it is safe to say that there are no voters who have all the information about the benefits and costs of the policies of every party and candidate. Likewise, there are no parties or candidates that have information on the individual will of every voter in the district regarding each policy. In other words, perfect information does not exist between candidates and voters. However, even if lots of information is given to the

voters, there is no guarantee that their intention will be reflected in the election results. Voters in Japan are still required to write their votes in on the ballot, which results in many questionable ballots, and how these ballots are interpreted has often affected election outcomes. If these and other instances of imperfect information prevent the will of all the people from being reflected in policy, it is a grave problem for democracy.

This paper examines the state of this situation today to gain an understanding of the role that information technology could play in correcting the “informational imperfections” and improving the function of democracy.

2. Use of Information Technology in Elections

There are many areas in which information technology could be used to achieve a more integral connection between parties, candidates, and the constituency. The first area is election administration. During the 1999 national parliamentary elections in Korea, many of the candidates had their own websites: 73% in both the Millennium Democratic Party and the Grand National Party, 43% in the United Liberal Democrats, and 37% of the independents. More than 80% of the candidates with websites were elected. Moreover, the candidates whose websites had more visitors tended to have a higher percentage of the votes.

The second area is the collection of contributions online. Political contributions in Japan have been made mostly by special backers or businesses, while the general public has contributed little. In contrast, the 1998 Jesse Ventura campaign for the governor’s office in the State of Minnesota made extensive use of information technology. In addition to registering supporters and sending out e-mail, the website was used to promote his position on the issues and respond to detractors, and volunteers were recruited through e-mail. The campaign collected one-third of its contributions online. Gathering contributions online allows the campaign to make use of them directly and to get contributions from voters who have never made contributions. The third area in which parties, candidates, and the constituency can be more effectively integrated is electronic voting ballots. The next section takes a closer look at this point.

3. The advantages and disadvantages of electronic voting

(1) Two Methods of Electronic Voting

Ballots in Japanese elections require voters to write in their choices. This makes the procedure for voting and counting ballots complex and results in many questionable ballots due to incomplete names or similar problems. This commonly leads to lawsuits over these ballots and the overturning of election results. However, even though the individual who lost the election may still get into office as a result of a judgement, the original winner does not have the power of the office while the case is in the courts. This is of course a great loss to democracy. Information technology can provide a solution to this problem through electronic voting.

There are two methods of electronic voting: those that use a magnetic card, and those that use an IC card. The difference between the two methods is not significant to the vote itself, at least not from the point of view of the voter as end user. However, if cost or some other factor prevents IC cards from being distributed to each voter in each election, the question would then become whether a new card is issued for each election or the same card is used repeatedly, and this difference would be a significant one to the voters.

The following three points present themselves when considering the pros and cons of the balloting method from the viewpoint of the voter. The first point is whether forgeries can be prevented. How will the identity of the cardholder be verified? If this problem cannot be resolved, it will be very difficult to win over those people who are opposed to the introduction of electronic voting. In fact, can we say with 100% certainty that votes cast for party leaders were cast by the persons themselves? Preventing this problem from occurring in an electronic voting system is vital.

The second point is preventing personally identifiable information (such as voter registration number or voter ID) from being connected with a person's voting record. The ballot used in the simple written system currently in use in Japan does not have any personal information on it. This makes it impossible to connect a voter's personal information with a voting record. In an electronic voting system, however, it is not impossible to do if one so desired. Some people fear that this will take away the

freedom to vote created by anonymity. To give these people confidence in an electronic voting system, the method used must prevent both sets of data from being linked. Third and last, there is the question of what benefits electronic voting systems have over the traditional written ballots. Points one and two deal with how to remove the negative aspects of the electronic voting system when compared with the written paper ballot, whereas point three addresses the positive aspects of the electronic voting system that solve the difficult problems of the paper ballot.

(2) The advantages and disadvantages of the magnetic card method

How will the procedures associated with the magnetic card method benefit voters? This section considers those with the greatest potential benefits for voters.

First, the election committee for each electoral district sends out postcards to the voters in that district notifying them of the election. Next, voters bring their election notification postcard to the voting location and are issued a magnetic card. If the voter's personal information is stored on the magnetic card, the information could be matched with the voting record, which would raise concerns about losing the freedom to vote. On the other hand, magnetic cards are easily forged, so if there is no information on the card, it might be possible to forge huge numbers of cards that vote for a specific candidate.

One possible solution would be to enter a random seven-digit number on the card issued to voters when they bring in their election notification postcard. A seven-digit number allows for 10 million combinations, which provides more than enough combinations to accommodate the average district of 5,000 voters—even with a 100% voter turnout rate. After the polls have closed, only those ballots whose numbers match the list of combinations issued at the polls would be deemed valid, thus rendering invalid any forged magnetic cards.

This method provides a 99.95% degree of certainty in a district of 5,000 voters, which makes it a practical method for defeating forgeries. The random codes could be issued at the voting location, obviating the need to select valid codes beforehand and removing concern about leaking the valid codes.

There are two possible voting procedures following this step. In the first method,

voters with magnetic cards containing a valid code record their vote on an electronic polling machine, and then give the magnetic card to an election official, who deposits the card in the ballot box in front of the voter. In the other method, the voter inserts the magnetic card into the electronic voting machine and completes the voting process right there. The magnetic card is not returned.

Next is a summary of the advantages and disadvantages of the magnetic card system in both cases. The first advantage is the low cost of producing cards, allowing magnetic cards to be issued for each election. Issuing cards for each election reduces the possibility of problems such as loss of the magnetic card or forgeries. Second, there is no need to create an individual voter number or other personally identifiable information, which prevents voting records from being associated with a voter. This will also deflect some of the criticism based on privacy issues. On the other hand, being unable to make connections between the voter and the card, other than with the voting record, restricts the possible benefits and conveniences available to the voter.

However, these advantages and disadvantages are inherent in a system that issues voting cards for each election, and not in the magnetic card method itself. In a system in which the same magnetic card is used continuously, a whole different set of advantages and disadvantages appear.

(3) The advantages and disadvantages of the IC card method

The IC card method is relatively expensive in comparison due to the cost of issuing cards, so a continuous-use scenario is more likely. Therefore, the following is a description of the advantages and disadvantages of the IC card method in which an IC card is used continuously.

What voting procedure would hold the greatest advantages for the voter? First, the voting committee in each district would have to issue an IC card with a picture of the voter for every resident in that district when they turned 20 years of age. Next, the voters would go to the polls during an election, give their IC cards to the election official, who would insert them into the electronic voting machine. This prevents voters from using another person's IC card to vote. After completing the ballot, the IC card is removed from the machine and given to the voter to take home.

What voting procedure would hold the greatest advantages for the voter? First,

the voting committee in each electoral district would issue an IC card, which includes a picture of the cardholder, to every resident in that district when they turned 20 years of age. Next, the voters would go to the polls at election time and give their IC cards to the election official, who would insert them into the electronic voting machine. This prevents voters from using another person's IC card. After completing the ballot, the IC card is removed from the machine and given to the voter to take home.

The electronic voting machine would be designed not to keep any personally identifiable information. This preserves the freedom of voting. In the same manner, voting records would not be stored on the voter's IC card. Storing voting records on the card would enable voters to go to the candidate they supported and receive money for their vote.

What are the advantages of the IC card? First, the election committee would not have to issue and mail out cards for each election. Second, the ease of confirming the identity of the rightful cardholder would remove the costs associated with preventing forgeries. Third, there are many additional benefits for the voter. For example, voters could vote at any location in any electoral district using their cards. Plus, the ability to restrict the issue of certificates of residence to the cardholder or the cardholder's family helps to protect privacy. Blood type and medical history could also be stored on the IC card, with the person's consent, and this information could be helpful in getting proper medical treatment in the event of a car accident or other tragedy.

There are, however, disadvantages as well. First, the personally identifiable information (voter registration number, etc.) on the IC card could potentially be retained on the electronic voting machine, despite claims to the contrary, and this would enable someone to connect voting records with individuals. Second, the continuous-use IC cards would create concerns about the loss of personal privacy, much like the concern caused by the national identification number system.

The first disadvantage could be overcome by combining the magnetic card and IC card methods. The IC card carried by voters could be used to issue a magnetic card with a random seven-digit number. However, issuing an IC card and a magnetic card to each person would raise costs. The second disadvantage has less to do with the problems of electronic voting and more to do with the permanent voter registration

number or the national identification number system, which probably should have its own discussion.

This comparison clearly shows that there are major differences in the potential advantages and disadvantages depending on the voting method. It is also clear that when introducing electronic voting, consideration must be given to preserving the freedom to vote by preventing any personally identifiable voter information from being connected with the voting record. Failure to give due consideration to these points alone will result in a backlash of opposition to introducing the system.

These problems aside, the discussion of electronic voting includes more efficient casting and counting of ballots, increased speed in counting ballots, lower costs in terms of personnel and other resources, fewer questionable ballots, and higher confidence in the election results. Not relying on the subjective judgement of the ballot counters and an increased confidence in democracy could be considered the most compelling argument in favor of electronic voting. Another important advantage is the additional convenience for voters.

4. Sharing Information through IT: the multilingual knowledge database system

(1) The Knowledge Database System

The information held by the Japanese government is difficult for the average citizen to access, to say the least. The ability to immediately release election results from each electoral district in a national election is a recent achievement. In the past, one would have to collect all the election results issued by each prefecture and city government or collect the local editions of a major newspaper from each area nationwide. Prior to that, one would even have to go to the regional offices of major newspapers (typically Sapporo, Tokyo, Osaka, and Fukuoka) and collect the newspapers the day after the election.

This dearth of information was not limited to election results. At that time, up-to-date information on new or revised laws was not easy to come by. Even more serious, judges, lawyers, and others in the legal system may not have had access to legal precedence and may have been operating without complete information.

This resulted in drawn out court cases, and greatly added to the suffering of many

people. If a knowledge database could reduce, even a little, the losses incurred by the people due to incomplete information, it is a must-have item for a democratic society.

Furthermore, it would require vast sums of money to obtain, read, and extract the necessary information from the election results, national census results, laws, legal precedence and other information from other countries and in other languages. This has resulted in numerous cases in which Japanese companies starting businesses overseas have suffered huge losses because they did not fully investigate the legal precedence in that country. There have been many instances of companies suffering huge losses later because they did not take the appropriate steps early enough when trouble began. The problems caused by this lack of complete information exchanged between countries results in losses for Japanese businesses and the Japanese people, and may result in loss of confidence and worsened relations between countries as well.

Thus, a knowledge database could be a solution for mitigating the losses incurred due to incomplete information within and between countries.

(2) Introduction to the Knowledge Database System

The technical discussions about database structure and systems have been omitted here because they would be too lengthy. First, this paper gives an outline of the meaning of the word “database” as commonly understood in everyday usage, rather than a strictly accurate definition based on database theory. “Data” here refers to things like the divorce laws of Malaysia or the legal precedents of bankruptcy in the Philippines, and the total body of collected data is described by the word “databank,” which was quite common a long time ago. What is important here is how this simple collection of data is processed. Since data continues only to increase, in the end, one ends up with a pile of data the size of a seven-story building. That data must be managed, and when the time comes, the necessary data must be retrieved. In this paper, this managed data is called a “database,” and the system used to manage this database is called a “database system.”

There have been many database systems created in Japan. In the 1970s, for instance, the then Ministry of Education designed a multipurpose statistical databank, and I was one of the contributors to that project. I also contributed to another database system for the medium-sized electoral districts system in 1980, in which there were political databanks set up in each of the electoral districts. I have collected data on 3,200

municipalities in Japan since 1997. However, the database system discussed in this paper is the East Asia Legal and Political Knowledge Database System, which was created between 1998 and March 2003.

Currently, a databank of political data is being created on Japan covering areas of 1, 2, and 3 meshes—square areas that are several hundred meters on each side and are smaller than a municipality.

The legal data component places particular emphasis on East Asia finance law. This emphasis is a result of the problems Japanese businesses have had advancing into East Asia. Countries seeking to attract direct foreign investment promote their advantages, and in many cases, small- and medium-size businesses finally decide to move in, only to find that the local laws are extremely unfavorable. There was a need for the ability to research the legal systems of foreign countries before establishing operations there, which inspired this project. There are also many exchange students and researchers in Japan from many Asian countries, like China, South Korea, Taiwan, and Thailand, and we wondered if it was possible to create a research environment in Japan comparable to those in their home countries.

The following is a brief explanation of the basic specifications of this database. The first requirement was that the database be accessible in the user's mother tongue since that is most comfortable for the individual. At first, we did not know how many laws there were in the Asia region, but in the process of creating the database, it was clear that there is an enormous number of them. The average database has a long access cycle, so another requirement was a split-second response time (not just less than a second, but in the low tenths of a second) that did not interrupt the thought process. When implementing a multi-lingual database, the world's two most difficult languages to accommodate are Chinese and Korean, whose operating systems are different from those of other languages. Alphabet-based languages do not pose too much difficulty, so arrangements for Indonesia, Malaysia, Singapore, and the Philippines are not a problem. This paper discusses the East Asia database, but this database will eventually be able to be used in any country in the world. The only bottleneck is languages with joined letters, as these take a very long time to recognize. Languages without spaces between words are a little difficult, but even these languages can be accommodated.

The backend application used for this database is ADABAS. ADABAS was originally created for use on mainframes, and it is extremely fast even with large numbers of records. Currently, the system is being changed over from an ADABAS-based system to a Tamino-based system that uses XML.

The database includes information on Japan, South Korea, China, Indonesia, Malaysia, Singapore, and the Philippines. These countries were selected in order to work with the various operating systems used in the region, which include Japanese, Korean, Chinese, and alphabet-based languages. The database is compatible with alphabet-based operating systems in German, French, and Spanish if the umlaut and accent symbols are excluded.

A web search format is used to deliver multi-lingual search results. A Japanese person dealing with a Korean law can search by entering Japanese keywords that are then translated into Korean, which is then used to extract all relevant hits. Indonesian, Malaysian, Chinese, Korean, Japanese, English—the system works seamlessly between any language pair, enabling access to the data of any country. In addition to legal data, there is national census data, election results, major newspapers, and other sources of information from each country. It includes the English-language newspapers from Indonesia, Malaysia, Singapore, and the Philippines. The Japanese national census data alone is equal to about 2,000 volumes of the Unabridged Genius Japanese-English Dictionary. This would take up one floor of a university library. With this database, the entire body of information, including laws and legal precedence, is collected on one server. There are also two small servers for different operating systems compatible with Chinese and Korean.

The strength of this system is the ability to search large volumes of data quickly, compared with a simple collection of data in a databank. Since the system is web-based, world-wide access is possible with just a computer and an Internet connection. The system also takes up much less space than paper references. Searches are performed generally by entering keywords, but they can also be performed using the mouse alone. Information can be downloaded immediately for storage in any medium.

There are several problems with this database system that still need to be resolved.

First, there is the obvious need to expand contents, but the time it takes to incorporate the yearly additions and updates to laws and legal precedence is a stumbling block. In such countries as Singapore, which releases laws and legal precedence to the public (in digital format), updating is feasible. Indonesian legal precedence, however, is released on paper, which, while accessible, is difficult to read with a scanner, possibly due to the paper quality. Currently, this information is being entered manually.

Second, in a multi-lingual system, there is the problem of how to expand keywords. Keywords are obviously the lynchpin of database searches. To create a system that can take keywords entered in any language and translate them to the other appropriate languages, several law and political science specialists from each country must translate the specialized vocabulary, which must be checked and the rough spots further refined. It is a lot of work. At this point the system is able to accommodate the standard vocabulary of each country, but how to deal with keywords in non-standard vocabularies, even within one country, is a difficult problem.

Third, there is the issue of how to extend system functionality. To incorporate the different data file formats from different countries into one database, conversion to an XML-compatible system is vital. This is why we are in the process of making this system XML compatible, as mentioned earlier.

In any case, the database system is extremely flexible and can be configured to meet almost any need; if it can help to remove some of the disadvantages faced at home and abroad, it will be a wonderful thing.