Relationship of Personal Data Protection towards the Electoral Measures: Partial Least Square Analysis

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Abstract. The adoption of e-voting in several countries poses certain challenges, which are very similar when electronic means are applied to any activities, such as e-governance or e-commerce. Therefore, some people due to economics, politics or social reasons expect the e-voting use will facilitate and solve previous election’s problem. Unfortunately, the most complex and difficult practical implementation with distinct problems depends on the particular condition or culture. One of essential factor concerning the adoption related to privacy protection. Thus, this study examines the relationship of perceived benefit and privacy concern towards personal data protection by establishing model of formative measurement. For the generalization purposes, a survey questionnaire consists of 4 categories of 45 items was distributed offline and online to approximately 800 people with purposive sampling in selected multicultural cities in Indonesia. The result suggested that the Perceived Benefit (PBen) has the strongest predictive value of $f^2$ and $Q^2$ compare to Privacy Concern (PCon) with 0.212 and 0.083 respectively.

1. Introduction
In this following years, it is obvious that e-voting must not be conducted unless at least majority stakeholders involves party and citizens have trust the mechanism and procedure of the system such as verification, validation and tabulate. In addition, some aspects need to be considered related to attempt to include certain type of groups such as disadvantaged or disable person. Furthermore, it takes certain stage or phase to develop strong system where related research should be conducted first in term of management and technical before introducing e-voting. The main supporters of the election are the relevant parties that influence political will in the legislative such as ruling government and qualified entrepreneur and IT corporate that have capability to provide hardware and software to conduct e-voting effectively and efficiently. In fact, the technologies for election face a mountain of scrutiny whereby it requires a high degree of integrity through multiple dimensions both by public expectation and law. These include secrecy therefore people cannot find out how people voted and what the vote content is to avoid coercion because citizen wants to have fair and honest election, which represents the reality. There some negativity or sceptics from certain groups regarding distinct nature between the commercial and political contexts with financial transactions.

In commercial purposes, corporate provides security measures in the engagement process by requesting the identification of related users to ensure credibility, then maintain the record of the user in regard the activity in the system. In contrast, there is a strong emphasis on secrecy and confidentiality in e-voting. Which is not limited to users’ identity but also the process. In paper balloting, there is temporary record that is kept that connects a person with a particular option. When elected officers
authorize a secured review, how investigator can address the conflict of interests of them who might strong incentives to undermine the problem. In principle. There are high possibility of certain position have affordability to exploit vulnerabilities knowledge, especially when defending status quo [1]. Several issues should be prioritized over the other comprehensively by understanding the nature of the system and the demand from the users. In the early phase, this study explores the influence factors from three different perspective namely technology solution (TSol), social norm (SNorm), and legal regulation (LReg) by investigating several attributes in perceived benefit (PBen) and privacy concern (PCon) that intentionally motivated users to protect personal data (PDPro) of themselves in e-voting. The result in the Partial Least Square (PLS) from the previous search [22] has been by simplifying into 100 samples due to the limitation but it is not degrade the interpretation because of the nature and characteristics of PLS itself.

2. Literature Review

A. Legal Regulation
The law builds an obligation among the individual's conscience which belongs to the culture area where those values are accepted [5]. Thus, it is critical to have the customer's data protection in getting their trust considering ICT firms which are evolving from a pure focus on the software and communications to services providers [6]. Holding the annual election by electronic voting can offer several advantages such as more participation, simpler than manual approach, more efficient and secure voting process. Thus, the bylaws for many associations containing provision recognizing the electronic documents and signatures [2]. The federal guidelines which some states incorporate, at least indirect, to their requirements of certifications could not be stringent to test the vulnerabilities. Minimally, jurisdiction can seek contractual permit to decide if machines which have or are going purchase or are easy to detect attacks [3]. The legal requirements should be created more concrete as legal criteria by deciding the regulations of simple la and decision on other courts, in which contains the assurance criterion and security application such as communication-based, corruption-based, computational and timing capabilities [4].

B. Technology Solution
Recent studies showed that the Internet users private information concerning to be the main antecedent of eagerness to disclose their private information thorough Internet [7]. Hight concerned Individuals of private information protect theirs by adversely responding to information practices of organization when they think that their private rights are threatened although privacy concern also can decrease the level of trust [8]. Concerning privacy causes the consumers select data protection, guide their appreciation to the existing ones and steer their choice among the competing business although the approaches to measure them are fragmented and frequently ad hoc, at the detriment of reliable results [8]. Additionally, past research also indicate that the importance of role of privacy concern in explaining user resistance behavior phenomenon in which it has negative interrelations with to explain the user resistance phenomenon of behavior [10]. In the context of election, the transfer of biometric data over public networks raises privacy concerns on the side of users to provide a means for protection by certain authentications schemes [11].

C. Social Norm
In the absence of privacy level, it would be extremely hard to sustain a distinctive feature between individual and public concern or to implement social and political rights in certain context like the right to have freedom of the association, the opinion, the religion and the expression [12]. In addition, the structural characteristic and comparative importance of socialization agencies change spasmodically, which universal sequences of socialization can be postulated only if the investigator believes that individual maturation follows a more or less repetitive course dictated by characteristic interaction between environmental constraints or facilitations and developmental uniformities [13]. According to the approaches on democratic society, privacy has valuable points for two reasons firstly, it will enable the individual to built and keep the varieties of complex social relationship and therefore gives the development to rich diverse society. Secondly, it is necessary to protect the critical human right, which an isolated location or private area will be necessary to develop the dissenting overview that enlarge
political and economic life. Consequently, it is the public interest to protect privacy, moreover, no matter how value the privacy to the individuals [14].

3. Research Methodology
This study examines that every set of the predictors separately constructed to each subparts of the structural types with survey questionnaire as data collection [21, 22], partial least square as data analysis by using smartPLS [23] and 790 total samples. In the model, LReg, SNor and TSol act as predictors for PBen and PCon respectively and both for PDPro. The indicator which is observed constructs the formative latent constructs which are not viewed related or correlated one another similar to the case of reflective constructs [15]. Together with partial least square as well as building theory, the writer ill specify which one of the observed constructs that ought to load on it [16]. Reliability will not be applied to these formative indicator as it is not necessary to correlate nor possess high internal consistency when measured by Cronbach’s alpha [17]. Thus, content validity has been established with a thorough literature search of previous research in qualitative approach to ensure its content reliability. Each construct has been identified from previous research by synthesizing the relationship between current previous models with emphasizing the relevant factor. When the measures of the construct have been confirmed reliable and valid through analysis of previous study, generally in the privacy context and specifically in the voting context, the next step of this study is to assess the structural model. There are 12 items in LR and SN, 11 items in TS and 10 items in PDPro.

4. Result and Discussion
The model of hypotheses is the reflective measurement model due to the direction of the arrows from construct to item or indicator. It means that every model construct causes the co-variation for items or indicators. First, the multicollinearity issue needs to be anticipated, an occurrence where to or more predictor create a multiple regression model has high correlation. Therefore, the tolerance level for reflective measurement model indicators that under 0.20 but for VIF more than 5.00 for predictor constructs are considered as indicative of high collinearity. If the value of tolerance or VIF are exceeds these thresholds, this study prefer other reflective measurement model through deleting constructs, to merge predictors into one single construct or to build higher-order construct dealing with the problem collinearity. From the table results show that the constructs do not have any multicollinearity issues.

![Table 1. Collinearity Statistics](image)
PLS-SEM will work efficiently with little sample in sizes and model which is complex models and practically will make without assumptions data in terms of data distribution [18]. Moreover, PLS-SEM may handle easily the measurement of reflective model and formative and also one item construct without identification problems. There are researchers who claim that consideration of sample size do not have a role in applying the PLS-SEM. This idea is adopted by the often-cited ten times rule [19], that shows that the size of the sample ought to be similar with ten times of the largest number of formative indicators which are applied to measure a single construct or ten times of the largest number of structural paths which is directed to a certain construct in the structural model. This thumb rule is similar with telling that the minimum size of the sample ought to be ten times the max numbers of arrow heads which are pointing to a latent construct wherever in PLS path model. When the rules of ten times gives an irregular for the requirement of size, PLS SEM as a technique of statistic requires the researcher to consider the size of the sample against the model background and data characteristics [20, 21].

| Table 2. Partial Least Square Calculation |
|------------------------------------------|
|                                    | Original Sample (0) | Sample Mean (M) | Standard Deviation (STDEV) | Standard Error (STERR) | T Statistics (O/STERR)|O) |
|------------------------------------------|---------------------|-----------------|----------------------------|------------------------|---------------------|
| LReg - PBen                              | 0.088279            | 0.108389        | 0.124204                   | 0.124204               | 0.710757            |
| LReg - PCon                              | 0.196456            | 0.217798        | 0.117828                   | 0.117828               | 1.667318            |
| LReg - PDPro                             | 0.093936            | 0.115364        | 0.084210                   | 0.084210               | 1.155496            |
| SNor - PBen                              | 0.364202            | 0.358915        | 0.118969                   | 0.118969               | 3.061311            |
| SNor - PCon                              | 0.193295            | 0.184596        | 0.120169                   | 0.120169               | 1.608530            |
| SNor - PDPro                             | 0.223347            | 0.215167        | 0.080085                   | 0.080085               | 2.788873            |
| TSol - PBen                              | 0.441382            | 0.436021        | 0.118800                   | 0.118800               | 3.791934            |
| TSol - PCon                              | 0.440688            | 0.441001        | 0.111854                   | 0.111854               | 3.939844            |
| TSol - PDPro                             | 0.325807            | 0.336562        | 0.094458                   | 0.094458               | 3.449239            |
| PBen - PDPro                             | 0.472056            | 0.478501        | 0.145274                   | 0.145274               | 3.249418            |
| PCon - PDPro                             | 0.266033            | 0.273025        | 0.142208                   | 0.142208               | 1.870739            |

\[
f^2 = \frac{(R^2 \text{ included} - R^2 \text{ excluded})}{(1-R^2 \text{ excluded})} \quad (1)
\]

\[
q^2 = \frac{(Q^2 \text{ included} - Q^2 \text{ excluded})}{(1-Q^2 \text{ included})} \quad (2)
\]

Besides the process of evaluating the size of the value $R^2$ on the whole predictor constructs, the $f^2$ value can be calculated through formula. The $f^2$ value is used to evaluate whether the omitted predictor construct has a substantive impact on the $R^2$ values of the predictor construct. Guidelines to access the value of $f^2$ for the exogenous latent constructs to predict the predictor constructs are as mentioned in Cohen (1988) are 0.02 (small), 0.15 (medium) and 0.35 (large). Based on the result (Equation 1), the total effect for this study has slight decrease after the EFA whereby LReg with 0.094 as the weakest towards PDPro followed by both SNor (0.223) and TSol (0.325). As indicated in the guidelines and the result from the formulated calculation, the $f^2$ value for the predictive value of PCon towards PDPro with 0.067 shows that it has a small effect in producing $R^2$ for its targeted construct, while PBen (0.212) has a medium effect. It indicates close to a medium effect in producing the $R^2$ for PDPro. Meanwhile, both PCon and PBen acted as the predictor construct for LReg, SNor and TSol. Further, the $f^2$ value for the
predictive value of LReg of 0.012 had a small effect in producing $R^2$ for its targeted construct on PCon. On the other hand, SNor and TSol had a moderate effect for its $f^2$ value as the predictive value on PCon with 0.215 and 0.269 respectively. Both LReg and SNor as the exogenous constructs has a small effects on PBen for its $f^2$ effect size as the predictive value with 0.049 and 0.053 except for TSol with 0.225, which had a close medium effect.

These results of the $f^2$ value added more information to the previous result on $R^2$ for developing the reflective measurement model for PDP. To evaluating the magnitude of the value $R^2$ as a characteristic of predictive accuracy, the value of $Q^2$ should also be examined as it serves as an indicator to the relevance of the predictive models. In specific, if a model of a PLS-SEM shows relevance pf predictive, it accurately predicts the data points of the indicators in reflective measurement models of multi-item and predictor constructs (Hair, et al, 2012). In model of SEM, the value of $Q^2$ is larger than zero in a certain reflective predictor of latent construct and it indicate that the path of predictive relevance model for a certain construct. The zero values of $Q^2$ or below show that it has deficiency of the predictive relevance with $f^2$ values has score of 0.02, 0.15 and 0.35 that explain that an exogenous construct has a small, medium, or large predictive relevance for a selected predictor towards response.

**Figure 1. Consistent Partial Least Square**

The approach for cross validated redundancy does not applies only to the structural model as the scores of the factor constructs but also the measurement model of the predictor. The researcher runs the blindfolding option for cross-validated redundancy as a measure of the value of $Q^2$ because it covers the key element of the path model, which is the structural model to predict eliminated data points. The mechanism to obtain the $Q^2$ value is similar with $f^2$ value by including and excluding the exogenous construct with share the same formula. Both PBen (0.083) and PCon (0.022) have a weak predictive relevance for a selected predictor construct of PDPro. Both LReg (0.010) and SNor (0.080) also had a weak predictive relevance in producing $Q^2$ on PBen while TSol (0.162) had a moderate effect of predictive relevance. On the other hand, all exogenous constructs of LReg (0.019), SNor (0.023) and TSol (0.093) had a weak predictive relevance as indicated with $Q^2$ value in the range of 0.02 and 0.15.

5. Conclusion

In summary, technology solution play highest role in linking to the process of privacy protection from citizen perspective while legal regulation is the lowest, which is quite surprising. These result might be happened due several reasons such as the complexity of regulation to be understood by common people.
and the advancement of technology that has become part of daily activities. Meanwhile, the citizen concern on the various aspect of graphical user interface such as component, configuration and features. Considering the multi-ethnic, diverse culture and different education background from citizen, the GUI design should take important note of accessibility, usability and simplicity. Interestingly, technical aspects also gain important spot based on citizen perspective, as they became more knowledgeable due to massive information from media. An attempt to promote positive behaviour around community can assist and encourage them for good attitude and response in struggling their daily life. Citizen who are concerned about PDP would take precaution to reduce the risks, such as refusing to disclose information to a website or removing information from a website.

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