Digital medical data protection compliance among medical staffs

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Abstract. The data protection compliance has been discussing among multidiscipline academician and practitioners. However, there is a lack of prior study conducting in Indonesia’s environment. Therefore, this study has a research objective of investigating the effect of perceived ease of use and perceived usefulness on attitude toward data protection policy among medical staff in west Sumatra, Indonesia. Besides, this study also seeks to determine the relationship between attitude toward data protection policy and data protection compliance. Data is gathered through survey and analysed using the SEM-PLS. Smart-Pls is applied by considering the assessment of measurement and structural model. The result shows that there is a positive significant relationship between perceived usefulness and attitude toward data protection policy. This study documents a positive association between attitude toward data protection and data protection compliance. Practically, this study implies that to increase the compliance behaviour among medical staffs, the institution has to increase the attitude toward data protection policy and perceived usefulness. Theoretically, this study contributes to the technology acceptance model.

1. Background of the study
Medical data protection compliance has been regulated in Indonesia by Indonesia’s ministry of health: 269 in 2008. Even though, there are the existence of such medical data protection’s laws and regulations which has an objective to make sure the protection of sensitive data, there has been increasing in medical data breaches recently [1]. Compared to other industries, health care industry is the most vulnerability due to the unique sensitive of personal data. As stated by [2], data protection is a basic human right. Identified disadvantage of violation has been remedied by introducing new regulations, job instruction, and guideline. It is often without researching the antecedents of incompliance [3].

Previous researches investigate the data protection compliance has been done in few countries. For example, [4] investigate the effect of organization environment and healthcare professional on medical data protection compliance intention in US by applying the theory of social psychology, management and information system and conclude that organizational and individual factors influence the intention to comply with medical data protection. Further, [3] survey the medical data protection compliance in German. They found that subjective value and personal factor affect the compliance. Among significant individual factors are attitude toward data protection policy, subjective norm, perceived usefulness, but not for perceived ease of use [3]. Meanwhile, [1] determines the intention to comply with data protection...
regulation from perspective of plan behaviour [5]. In addition, [1] adds other two independent variables: punishment severity and detection certainty. He find that attitude, subjective norm and perceived behaviour control are significant factors affecting the compliance intention. However, punishment severity does not have a significant relationship with compliance intention.

From Intensive literature review above, we can conclude that study in medical data protection compliance is still limited, especially in Indonesia. The affecting factor is still inconclusive. For example, the perceived ease of use is a predictor of compliance behaviour in regard to the theory of plan behaviour. Yet, [3] document that the perceived ease of use has an insignificant effect on compliance behaviour. Therefore, there is desire need for further investigating factors affecting the compliance behaviour based on technology acceptance model (TAM) [6] and theory of plan behaviour (TPB) [5]. Medical data protection acceptance and willingness to comply regulation and rules could be underpinned by technology used and perception of possible consequences [3]. Therefore, this aims to investigate the effect of perceived usefulness and perceived ease of use on attitudes toward data protection policy among medical staffs in West Sumatra, Indonesia. Besides, this study also investigates the relationship between attitude toward data protection policy and data protection compliance. Thus, remainder of this paper is organised as follow. The next section is method and material and followed by result and discussion. Finally, this paper is closed by conclusion and recommendation. The conceptual framework is demonstrated in Figure 1.

### Figure 1. Conceptual Model

#### 2. Method and Material

Research object is medical doctors/staffs working in hospital. Sixty-three medical doctor and medical staff participated in this study. Primary data is applied which is gathered through online survey. Since this study is quantitative approach, it utilizes two latent independent variables (perceived ease of use and perceived usefulness) and two latent dependent variables (attitudes and data protection compliance). Perceived ease of use has two item was developed by [3]. In addition, perceived usefulness is modified by [3] and this latent variable has seven items. Meanwhile, attitude toward data protection policy is tailored by [7] which consists of four items. Finally, data protection compliance is developed by [8][9][10]. All variables are measured by five-scale Likert ranging from strongly disagree to strongly agree. SEM-PLS is used for data analysis method with smart-pls. There are two assessment in smart-pls: measurement model and structural model [11]. In measurement model assessment, it assess the construct validity which consists of two validity: convergent validity and discriminant validity [12]. The structural model is assessing the predicative relevance and predictive power [12]. The relationship between latent independent variable and latent dependent variable is assessed by path coefficient and t statistic or p value [13]

#### 3. Result and discussion

Table 1 provides demography data of the respondents of this study, as can be seen bellow. Sixty-four respondents fill questioners. Based on gender, twenty-three respondents (36%) are male, and the rest is...
female. It around 39 (61%). According to age, 22 (34%) respondents are dominated by age of 41 to 50 years old. It followed with above than 50 years old around 11 respondents (17%). It around 10 respondents (16%) in range of 31 to 40 years old. While, 6 respondents (9%) is categorized in 20 to 30 years old. Finally, job tenure is dominated by respondent with job experience more fifty years.

### Table 1. Demography Data

| Category               | Number | Percentage |
|------------------------|--------|------------|
| Gender                 |        |            |
| Male                   | 23     | 36         |
| Female                 | 39     | 61         |
| NA                     | 2      | 3          |
| 20 to 30-year-old      | 6      | 9          |
| 31 to 40-year-old      | 10     | 16         |
| 41 to 50-year-old      | 22     | 34         |
| > 50-year-old          | 11     | 17         |
| NA                     | 15     | 23         |
| 5 to 10 years          | 15     | 23         |
| 11 to 15 years         | 9      | 14         |
| > 15 years             | 22     | 34         |
| NA                     | 3      | 5          |

3.1. Assessment of Measurement model

As mention above, the measurement model assessment is divided into convergent and discriminant validity. Result of convergent validity can be seen in Table 2 below. The first construct (Attitudes toward data protection policy) has four valid outer loading with value greater than 0.7 [14]. In addition, internal consistency reliability for attitudes construct is also reliable with Cronbach’s Alpha (CA) and Composite Reliability (CR) is 0.915 and 0.941 respectively [15]. Further, value of Average Variance Extracted (AVE) for attitude construct is 0.799 and it is greater than 0.5 [15]. Second construct, data protection compliance, it has the outer loading for all items is 0.900, 0.928, and 0.947 for item 1, item 2 and item 3 respectively. Indicator reliability is greater than 0.7 and it can, therefore, conclude that the indicators are reliable [14]. Further, internal consistency reliability of data protection compliance construct has Cronbach’s Alpha (CA) and Composite Reliability above 0.700 [15]. Last convergent validity for data protection compliance is average variance extraction (AVE) and its value is 0.856 which is greater than 0.5 [15].

### Table 2. Measurement Model Assessment: Convergent Validity

| Construct                   | Items | Outer Loading | Cronbach’s Alpha | Composite Reliability | AVE  |
|-----------------------------|-------|---------------|------------------|-----------------------|------|
| Attitude                    | att1  | 0.909         |                  |                       |      |
|                             | att2  | 0.903         |                  |                       |      |
|                             | att4  | 0.941         | 0.915            | 0.941                 | 0.799|
|                             | att3  | 0.818         |                  |                       |      |
| Data-protection compliance  | dc1   | 0.900         |                  |                       |      |
|                             | dc2   | 0.928         | 0.916            | 0.947                 | 0.856|
|                             | dc3   | 0.947         |                  |                       |      |
| Perceived ease of use       | peu1  | 1.000         | 1.000            | 1.000                 | 1.000|
Construct of perceived ease of use has two items and only one item is reliable with value of outer loading greater than 0.7 [14]. Further, the internal consistency reliability is indicated by Cronbach’s Alpha (CA) and Composite Reliability (CR) also has greater than cut-off value which is required by experts [15]. Thus, last convergent validity test using average variance extraction (AVE) also show valid item for perceived ease of use construct due to the value of AVE greater than 0.5 [15]. Perceived usefulness’ (fourth construct) has seven items and only six items has outer loading greater than 0.7 [14]. The internal consistency reliability of construct also has Cronbach’s Alpha (CA) and Composite Reliability above the cut off value (0.7) and therefore, the construct is reliable [15]. Finally, the average variance extraction (AVE) which is measuring the other convergent validity also indicate the valid construct because it has value of AVE above 0.5 [15]. The second construct validity is discriminant validity. There is at least two tests that be used to see the discriminant validity: Fornell-Lacker criterion and cross-loading [11]. Fornell-Lacker criterion is the AVE of a latent variable should be greater than the squared correlations between the latent variable and all other variables [16], [17]. The result of Fornell-Lacker could be seen in Table 3 below.

### Table 3. Measurement Model Assessment: Discriminant Validity-Fornell-Lacker Criterion

| Construct                        | 1     | 2     | 3     | 4     |
|----------------------------------|-------|-------|-------|-------|
| Attitude (1)                     |       |       | 0.894 |       |
| Data-protection compliance (2)   | 0.702 |       | 0.925 |       |
| Perceived ease of use (3)        | 0.512 | 0.546 | 1.000 |       |
| Perceived usefulness (4)         | 0.731 | 0.818 | 0.605 | 0.847 |

The second property for discriminant validity is cross loading. The loadings of an indicator on its assigned latent variable should be higher than its loadings on all other latent variables [18]. The result of cross loading can be seen in Table below. From the table, we can see that loadings of indicator on its assigned latent variable is higher than its loadings on all other latent variables. For example, loadings of all items for attitude construct is higher than its loadings on perceived usefulness, perceive ease of use and data protection compliance. Therefore, attitude construct is valid in term of discriminant. The measurement model is demonstrated in Figure 2.

### Table 4. Measurement model assessment: Discriminant Validity-Cross Loading

| Items  | 1     | 2     | 3     | 4     |
|--------|-------|-------|-------|-------|
| att1   | 0.909 | 0.626 | 0.469 | 0.665 |
| att2   | 0.903 | 0.628 | 0.431 | 0.616 |
| att3   | 0.941 | 0.603 | 0.473 | 0.620 |
| att4   | 0.818 | 0.643 | 0.451 | 0.699 |
| dc1    | 0.654 | 0.900 | 0.497 | 0.720 |
| dc2    | 0.563 | 0.928 | 0.434 | 0.726 |
| dc3    | 0.714 | 0.947 | 0.569 | 0.816 |
3.2. Assessment of Structural Model
The result of structural model assessment can be seen in Table 5. There are two kinds of assessment for predictability: predictive relevance and predictive power [12]. Predictive relevance uses the Q square and the value should be higher than 0. Q square for all endogenous constructs (attitude and data protection compliance) have Q square exceed zero. In fact, they are categorised as large predictive relevance due to the value above 0.3 [19]. In addition, predictive power is assessed by R square. The result shows that all endogenous constructs have R square around 0.5 and it has a moderate predictive power [20].

**Table 5. Structural Model Assessment**

| Endogenous Construct                        | Q square | Decision | R square | Decision |
|---------------------------------------------|----------|----------|----------|----------|
| Attitudes                                   | 0.371    | Large    | 0.541    | Moderate |
| Data protection compliance                  | 0.382    | Large    | 0.493    | Moderate |

| Relationship                                | path coef. | t stat | p value | Decision |
|---------------------------------------------|-------------|--------|---------|----------|
| Attitude - > data-protection compliance     | 0.688       | 6.394  | 0.000   | Supported|
| Perceived ease of use - > attitude          | 0.120       | 0.993  | 0.321   | Not supported |
| Perceived usefulness - > attitude           | 0.645       | 5.970  | 0.000   | Supported |

Path coefficient and p value are indicators used to decide whether hypothesis is supported or not. The effect of perceived ease of use on attitude toward data protection compliance is not supported due to the t statistic is less than 1.69 or p value is greater than 0.05. Therefore, the first hypothesis is not accepted. In addition, the relationship between perceived usefulness and attitude toward data protection policy is significant. Thus, the second hypothesis is accepted. The significant relationship is supported.
by $t$ statistic above 1.69 (5.970) or $p$ value is less than 0.05 (0.00). Meanwhile, attitude toward data protection policy has a significant association with data protection compliance because it has $t$ statistic above 1.69 or $p$ value is less than 0.05 (0.00). The structural model is demonstrated in Figure 3.

![Figure 3. Structural Model](image)

The effect of perceived usefulness on attitude toward data protection policy is a positive. It means that the higher the perceived usefulness, the higher the attitude toward data protection policy. This finding confirm the Technology Acceptance Model (TAM) [6]. If stakeholders have experience and conclude that technology is usefulness and therefore, they have a positive attitude. Beside, this result is also consistent with [3] which also find that there is a positive effect of perceived usefulness on attitude toward data protection policy. Meanwhile, attitudes toward data protection policy also has a positive relationship with the data protection compliance and it imply that the higher the attitudes, the higher data protection compliance. The finding is confirming the technology acceptance model [6]. Comparing to previous research, this study support the finding of [1], [3]. The insignificant effect of perceived ease of use on data protection compliance is not aligned with [3].

4. Conclusion and Recommendation

Digital medical data protection compliance has been critical since it is personal data and very sensitive. Therefore, this study is very important to be done in Indonesia environment as this kind of study is very limited. Technology acceptance model predict that attitude toward data protection is determinant of behavioural intention. Thus, behaviour intention is predictor of behaviour. This study aims to investigate the effect of perceived ease of use and perceived usefulness on attitude toward medical data protection. Besides, this study also examines the effect of attitude toward data protection on medical data protection compliance. The result shows that perceived usefulness has a positive relationship with attitude toward data protection. Further, attitude toward data protection positively influence the data protection compliance. This finding implies that data protection compliance or behaviour could be explained by technology acceptance model (TAM) and theory of plan behaviour (TPB). Practically, medical doctor institute and hospital management can boost the data protection compliance by increasing the attitude toward data protection. Improving the behaviour intention also can be done through increasing the attitude toward data protection. Several limitations to this paper need to be acknowledged. First, the number of medical doctor/staffs participated in this study is small number. Second, this study only sees the compliance behaviour from perspective TAM and TPB. This research has thrown up many questions in need further investigations. First, further investigation can widen the number of research object or sample size in order to gain the robust result. Second, future research needs to be done by investigating the data protection compliance from other perspective, such as the unified theory of acceptance and use of technology (UTAUT).
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