

Paper Reading

Information Systems

Notes on Social Science Research

IS research often uses social science research methodologies. We discuss some social science research concepts below.

Scales: Social research often tries to measure constructs that are difficult to measure. Commonly used methods include self-report measures where several items are usually used to measure a construct. Scales are used to associate these measures into quantitative units. We will discuss the Likert method that is used in the paper. In the Likert method, each item is rated on a Disagree-Agree response scale, e.g. 1-to-5 or 1-to-7. The score for a respondent on the construct is the sum of all ratings on all the items.

For example, the authors use the following items on a four item scale is used to measure 'ease of use' in the paper:

- Learning to operate WriteOne would be easy for me.
- I would find it easy to get WriteOne to do what I want it to do.
- It would be easy for me to become skillful at using WriteOne.
- I would find WriteOne easy to use.

The respondent is asked to rate each item on a 7 point scale of Disagree to Agree. The final score for the 'ease of use' construct is the sum of the ratings on the all 4 items.

Validity: Validity is the strength of the approximation to the truth of the propositions. Commonly used validity concepts in social science include:

- *Conclusion validity* asks whether there is a relationship between the two variables. This can be tested using hypothesis testing.
- *Internal validity* asks whether the relationship is causal (see lecture notes on difference between correlation and causation). Randomized manipulation experiments is one way to validate causes.
- *External validity* asks whether it is possible to generalize the result to other settings, e.g. survey results within university may only hold for undergraduates. You should always be aware of threats to external validity, some of which are discussed in lectures.
- In social science research, we are often interested in concepts that are hard to measure, such as ease of use. The measurements used should measure the concepts that we would like to measure - *construct validity*. For example, if we have multiple measurements for *ease of use* and multiple measurements for *usefulness*, the measurements for ease of use should correlate more with each other than with the measurements for usefulness, and vice versa.

Reliability: Reliability refers to the consistency of the measurements - measurements should produce the same results under the same conditions, e.g. if you ask the same person the same question twice, you should get the same answer.

One way to measure the reliability is to split these types of items into two parts and measure the correlation between the measures constructed from each part.

The *Cronbach's alpha*, often used as an indication of reliability, is the average of the correlation coefficients over all possible ways of splitting the items into two parts.

Structural equation models are used in the paper. In regression models, every variable directly influences the outcome. This is often an incorrect model. For example, people with small feet, particularly children often have poor language skills and regressing language skill on shoe size would have a large standardized regression coefficient. However, it is obvious that feet size is not a cause for language skill but there is another variable such as age that is a common cause for both. Structure equation model is used to build causal regression model where the variables only depend on its causes. The causal structure can be represented as a directed acyclic graph (directed graph with no cycle). Deciding causality can often be difficult, particularly without manipulation experiments. As guideline, for A to cause B, A and B must covary, A must precede B and effect on A must be present when other causes of B are controlled. In structural equation models, the standardized regression coefficient is used to indicate the strength of causality and links are removed if the coefficient is small.

You will also need to understand what factor analysis does. See

<http://www.socialresearchmethods.net/tutorial/Flynn/factor.htm> for an introduction.

References:

- Research methods Knowledge base, <http://www.socialresearchmethods.net/kb/>
- Paul R. Cohen, *Empirical Methods in Artificial Intelligence*. MIT Press, 1995.

User Acceptance of Computer Technology: A Comparison of Two Theoretical Models

by Fred D. Davis, Richard P. Bagozzi and Paul R. Warshaw

You may want to use the questions below to help you understand the paper.

1. What is the problem that the authors are trying to model? Why is the problem important?
2. Why did the authors choose to compare the technology acceptance model (TAM) with the theory of reasoned action (TRA)?
3. The paper reports on a longitudinal study. What is a longitudinal study?
4. What determines the actual behavior in both TRA and TAM?
5. What are the direct causes of behavioral intention (BI) in TRA? Observe that any other factors are mediated by these direct factors i.e. if we know the values of these factors we can ignore the values of all other factors. How are the relative weights of the factors estimated?
6. What affects attitude (A) in TRA?
7. What affects subjective norm (SN) in TRA?
8. What are the direct causes of BI in TAM?

9. What affects attitude (A) in TAM? What affects perceived usefulness (U) and what affects perceived ease of use (E) in TAM?
10. Why is subjective norm (SN) not included in TAM?
11. What are the key differences between TAM and TRA in determining A?
12. What are the research questions that the study seeks to address? Keep these questions in mind as you read about the empirical study. Try to relate the results back to the questions.
13. What is the software used for the experiments? Who are the subjects? How is the experiment carried out?
14. How was the salient belief for TRA elicited? What were the concerns of the authors? What are the resulting items that were used?
15. What are the items used for the ease of use factor and for the usefulness factor in TAM?
16. Was BI found to explain usage well? Does it fully mediate the effect of the other variables?
17. Which of TRA or TAM explains a larger proportion of the variance?
18. Is the SN component of TRA useful?
19. Does A and SN mediate the influence of the salient beliefs well in TRA?
20. Does A and U mediate the influence of E well in TAM?
21. What are the changes over time?
22. What are the belief dimensions suggested by factor analysis?
23. What did the experiments with the hybrid intention model show about the effect of A?
24. What are the most important determinants of BI for the two time periods?
25. What are the main insights of the paper?
26. What are the practical implications of the results?
27. Why is the paper influential?