Post Publication Review

Review

Theory development is at the heart of the scientific process in information systems. Knowledge from extant literature and observations of an information systems phenomenon underpin hypothesis development in information systems research about what is causing the phenomenon (e.g. enablers of benefit, cost, opportunity, or challenge) and how systems (e.g. process) work. Empirical studies (e.g. experiments) are conducted to test the hypothesis and a theory emerges when a hypothesis is confirmed. Most often, each theory employs a unique vocabulary to articulate specific constructs (or factors) that are considered important in explaining why an information systems phenomenon occurs and in predicting what is likely to happen next. Application of similar vocabulary, therefore, is indicative of potential replication.

Critical to theory development is conceptualization (Markus and Saunders, 2007; Suddaby, 2010). The paper by Zhang, Cable, and Rai makes a timely call for revisiting an underdeveloped area of conceptualization in information systems in the form of construct clarity. As the authors rightly point out, extant work in the information systems discipline has largely focused on the importance of construct validity and the ways in which construct validity can be met and enhanced (e.g. Gefen and Straub, 2005; Kuo and Dick, 2010; MacKenzie, Podsakoff, and Podsakoff, 2011; Sedera, 2015). By introducing and discussing facet theory and its methodological procedures (Guttman, 1954a, 1954b, 1971; Guttman and Greenbaum, 1998), the authors shed light on a useful solution that can improve conceptualization and theory development efforts through better construct clarity in information systems research.

More specifically, to achieve greater construct clarity, the authors suggest that "(1) concepts in a content universe should be specified in terms of all relevant facets, (2) the facets, collectively, should be logically exhaustive of the content universe, (3) the logical relationships among facets should be specified, whereby independence among facets is preferred, (4) each facet should be analyzed into a set of collectively exhaustive elements, (5) each facet should be analyzed into a set of mutually exclusive elements, (6) the logical relationships among elements of a facet should be specified, and (7) the relationships among the concepts defined according to the facets and the elements of facets should correspond to the focal phenomenon."

Notwithstanding the benefit and usefulness of these guiding principles in producing a richer and stronger conceptual understanding of a construct's relationships to extant related constructs, two key limitations are apparent (in addition to the other key limitations acknowledged in the paper—e.g. complications related to issue isolation and limited meta-theoretical principles). These limitations should spur further conceptual research and discussion in the area.

More specifically, the guiding principles proposed by the authors may only be relevant to constructs that are multidimensional. That is because salient facets (or the set of attributes that represent the underlying conceptual and semantic components within a content universe [Guttman and Greenbaum, 1998]) are absent in constructs that are unidimensional. This limitation is further amplified when construct validity takes precedence over construct clarity—for example, in studies that aim to obtain a macro understanding of constructs and to avoid aggravated responses (Bergkvist and Rossiter, 2007). Thus, further exploration for an alternative set of guiding principles using alternative theoretical lenses for establishing construct clarity for unidimensional constructs is highly encouraged.

Besides that, the limitation of using an avoidance strategy when assuming a neutral philosophical stance was accentuated in their paper as they chose not to delve into the expectations of construct clarity presented by positivists and constructivists. Hence, the

guiding principles that were proposed were limited to those that were adopted from McGrath's (1968) succinctly summarized set of principles for facet theory methodology based on implied logic. Using an approach strategy by delving into alternative streams of philosophical thought and expectations held by positivists and constructivists could have realized the greater potential for increased construct clarity. For example, delving further into the positivistic stream of philosophical thought could have produced new, additional guiding principles for greater construct clarity, such as those that account for (or guide researchers on how to deal with) prediction with multidimensional constructs that are dynamic and non-linear in nature (Falk, Hammerschmidt, and Schepers, 2010). The same could also be done for the constructivist stream of philosophical thought. Thus, delving into the expectations of these philosophical stances simultaneously should produce a more inclusive set of guiding principles for greater construct clarity (while maintaining a neutral standing).

In short, the paper by Zhang and colleagues should directly contribute toward helping information systems scientists develop and maintain good construct clarity, and indirectly contribute to the accentuation of novelties and knowledge comparability in the field. It is hoped that the articulation provided herein and in the paper by Zhang and colleagues would stimulate greater interest in conceptual work that enhances the rigorousness in establishing construct clarity for myriad types of constructs in information systems studies of different philosophical paradigms.

Weng Marc Lim
Swinburne University of Technology (Sarawak Campus)
wlim@swinburne.edu.my / lim@wengmarc.com

Acknowledgment

Author Response

We thank Weng Marc Lim for sharing his thoughts on our recent paper, *Toward Principles of Construct Clarity: Exploring the Usefulness of Facet Theory in Guiding Conceptualization*, published on Australasian Journal of Information Systems (Zhang et al. 2016). We are very pleased to know our colleague has been convinced of the importance of construct clarity in conceptualization and theory development, which is the primary motivation driving the paper. Lim brings two issues to light and believes these two issues are "two key limitations" of our paper. We herein offer a response.

Weng Marc Lim argues that our guidelines for construct clarity are relevant only to multidimensional constructs, but not to unidimensional constructs. We believe that Lim misunderstood the distinction between unidimensional and multidimensional constructs and confused "dimensions" of a construct with "facets" (as defined in our paper) of a content universe. Edwards (2001, p. 144) argues, "a construct is multidimensional when it refers to several distinct but related dimensions as a single theoretical concept." Regardless of ongoing debates on the value or existence of multidimensional constructs (Edwards 2001), for a multidimensional construct, its every dimension must also be a meaningful construct and thus has variance in empirical settings (Polites et al. 2012). For example, IS success may be considered a multidimensional construct (DeLone and McLean 1992) such that each of its dimensions meaningfully represents a construct (i.e., "system quality", "information quality", "use", "user satisfaction", "individual impact", and "organizational impact"). In contrast, a facet is defined as "a set of attributes (variables) that together represent underlying conceptual and semantic components within a content universe" (Zhang et al. 2016, p. 6). Several facets are used together not to define a particular construct, but to compare and contrast a number

of constructs. In the example illustrated by Zhang et al. (2016, p. 6), two facets (i.e., "evaluative response" and "evaluative target") are used to differentiate three constructs (i.e., "user satisfaction", "user information satisfaction", and "end-user computing satisfaction"). It makes little sense to say, for instance, "evaluative response" and "evaluative target" are two dimensions of "user satisfaction", because neither are "evaluative response" and "evaluative target" constructs, nor do they have variances in a particular empirical setting (e.g., "evaluative response" has a constant value of either "attitude" or "belief" in a setting). A construct can always be compared to and contrasted with other similar constructs through the principles suggested, irrespective of its dimensionality.

Weng Marc Lim further suggests the principles are limited for not considering the differences in the criteria between positivist and constructivist research traditions. We agree with Lim and believe there is further scope to appropriate and extend the guidelines with an eye to the distinctive expectations of positivist and constructivist studies.

Meng Zhang,
Queensland University of Technology,
m.zhang@qut.edu.au

Guy Gable,
Queensland University of Technology,
g.gable@qut.edu.au

Arun Rai,
Georgia State University
arun.rai@eci.gsu.edu

References

Bergkvist, L., & Rossiter, J. R. (2007). The predictive validity of multiple-item versus single-item measures of the same constructs. *Journal of Marketing Research*, 44(2), 175-184. doi: http://dx.doi.org/10.1509/jmkr.44.2.175

DeLone, W. H., and McLean, E. R. 1992. "Information Systems Success: the Quest for the Dependent Variable," *Information Systems Research* (3:1), pp. 60–95.

Edwards, J. R. 2001. "Multidimensional Constructs in Organizational Behavior Research: an Integrative Analytical Framework," *Organizational Research Methods* (4:2), pp. 144–192.

Falk, T., Hammerschmidt, M., & Schepers, J. J. L. (2010). The service quality-satisfaction link revisited: Exploring asymmetries and dynamics. *Journal of the Academy of Marketing Science*, 38(3), 288-302. doi: http://dx.doi.org/10.1007/s11747-009-0152-2

Gefen, D., & Straub, D. (2005). A practical guide to factorial validity using PLS-graph: Tutorial and annotated example. *Communications of the Association for Information Systems*, 16 (1), 91-109.

Guttman, L. (1954a). An outline of some new methodology for social research. *Public Opinion Quarterly*, 18(4), 395-404.

Guttman, L. (1954b). A new approach to factor analysis: the Radex. In *Mathematical Thinking in the Social Sciences*, P. F. Lazarsfeld (ed.), New York, NY, US: Free Press, 258-348. doi: http://dx.doi.org/10.1086/266532

Guttman, L. (1971). Measurement as structural theory. *Psychometrika* 36(4), 329-347. doi: http://dx.doi.org/10.1007/BF02291362

Guttman, R., & Greenbaum, C. W. (1998). Facet Theory: Its development and current status. *European Psychologist* 3(1), 13-36. doi: http://dx.doi.org/10.1027/1016-9040.3.1.13

Kuo, B., & Dick, G. (2010). The greening of organizational IT: What makes a difference? *Australasian Journal of Information Systems*, 16(2), 81-92. doi: http://dx.doi.org/10.3127/ajis.v16i2.592

MacKenzie, S. B., Podsakoff, P. M., & Podsakoff, N. P. (2011). Construct measurement and validation procedures in MIS and behavioral research: Integrating new and existing techniques. *MIS Quarterly*, 35(2), 293-334.

Markus, M. L., & Saunders, C. (2007). Editor's comments: Looking for a few good concepts…and theories…for the information systems field. *MIS Quarterly*, 31(2), 3-6.

McGrath, J. E. (1968). A multi-facet approach to classification of individual group and organizational concepts. In B. Indik and K. Berrien (ed.), *People, Groups, and Organizations*, New York, NY, US: Teachers College Press, 191-215.

Polites, G. L., Roberts, N., and Thatcher, J. 2012. "Conceptualizing Models Using Multidimensional Constructs: a Review and Guidelines for Their Use," *European Journal of Information Systems* (21:1), pp. 22–48.

Sedera, D. (2016). Does size matter? The implications of firm size on enterprise systems success. *Australasian Journal of Information Systems*, 20. doi: http://dx.doi.org/10.3127/ajis.v20i0.1224

Suddaby, R. (2010). Editor's comments: Construct clarity in theories of management and organization. *Academy of Management Review*, 35(3), 346-357. doi: http://dx.doi.org/10.5465/AMR.2010.51141319

Zhang, M., Cable, G., & Rai, A. (2016). Toward principles of construct clarity: Exploring the usefulness of facet theory in guiding conceptualization. *Australasian Journal of Information Systems*, 20. doi: http://dx.doi.org/10.3127/ajis.v20i0.1123