Towards a Theory and Operational Definition of Business Analytics

TREO Talk Paper

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Abstract
The purpose of this talk is to sketch a theory and operational definition of business analytics (BA). The intent is to facilitate advances in survey-based research examining the relationship between the use of BA and organizational impacts. This working theory is based on a critical review of survey-based research that include constructs related to business analytics and intelligence.

This review reveals a nascent stage of research development as reflected by a wide variety of content definitions, measurements models and theorized relationships with other constructs. A general finding is that analytics is undertheorized and a central premise is that, without better theory, empirical studies are unlikely to advance knowledge. Eight different conceptualizations of analytics are identified. In general, “analysis” is not defined and the essential elements of analytics are either not considered or are considered superficially. Oftentimes, analytics is conceptualized coarsely such as the use of various techniques. Sometimes, the content of analytics is not measured; rather, respondents report on a preconceived (or assumed known) construct. Without careful definition, the measurement of analytics is easily conflated with related constructs -- especially integration and organizational learning.

According to wordnet dictionary, analysis is “the abstract separation of a whole into its constituent parts in order to study the parts and their relations.” Analysis is opposed to synthesis where parts are combined to form a whole and thus analytics is distinct from and related to integration. Consistent with this definition of analysis, it is proposed that business analytics is essentially about abstractions of cause-effect relationships and, borrowing from decision theory, parts are conceptualized as situations, actions and outcomes. Since abstractions are models, this conceptualization provides a linkage to model-based decision support systems and to the notion of mental models used in executive support systems research. A key concern for theory development is whether models can be described on a continuum of one or more dimensions. Alter (1977) argued that decision support systems could be described “along a single dimension ranging from extremely data-oriented to extremely model-oriented” and which could be labeled as “the degree of action implication of system outputs.” The oft-quoted categories of descriptive, predictive and prescriptive analytics can be mapped to this scale.

While this conceptualization helps to define analytics, it does not help to explain how the use of analytics changes organizations. A process-oriented perspective is proposed where business analytics is conceived as the development and use of knowledge about cause effect relationships. Whereas analytics research generally uses an organization unit of analysis, earlier management support system research more often used an individual unit of analysis. This gap, which makes it difficult to connect these streams of research, can be bridged with a multi-level theory of organizational learning. One such theory is 4I theory of organization learning (Crossan et. al 1999) which includes activities of intuiting, interpreting, integrating and institutionalizing. This theory helps to link changes in individual cognition with changes in organizational processes. Roughly, an individual intuit a possible model of cause effect relationships. During interpretation, the model is developed -- either individually or by a group -- and possibly tested. The model is put into use during integration and requires the development of a shared mental model which through use coordinates action. Institutionalization ensures that model use becomes routinized and this last activity distinguishes organizational learning from individual and ad-hoc learning.