

■ DANIEL A. SAMSON, Feature Editor, University of Melbourne, Australia

# Tragic Conceptual Flaws of Theory-Building Empirical Research

by John G. Wacker, Visiting Professor, Arizona State University; Professor Emeritus, Iowa State University

When empirical researchers begin a research project, they usually target specific concepts to empirically test specific issues. Yet, frequently empirical evidence is found on hidden relationships that are important for extending existing theory. These relationships should be published to extend current theory and advance the knowledge of the academic field. The purpose of this article is to assist researchers to avoid tragic conceptual flaws that hinder their research or diminish its importance and impact. Failure to avoid these conceptual flaws causes research to become fact-finding and not theory-building.

Although this article will emphasize classical statistical analyses, it is also important to include case study methods that extend theory. To understand theory-building case research, it is necessary to differentiate between classroom and theory-building cases. Classroom cases are typically utilized to illustrate a specific set of issues in a 'real' world business environment. Classroom cases give business students and practicing managers an understanding of the organizational interfaces among people and functions that occurs during implementation of strategies and day-to-day operations. Alternatively, theory-building case research extends current theory by introducing new relationships in a more complex environment. Theory-building case research faces the same challenges as statistical sampling research since it must follow the same basic principles of science. Otherwise, case research will be considered fact-finding rather than theory-building research.

The purpose of this article is to highlight some common difficulties of

both types of empirical research. These difficulties are founded in classical philosophy of science that determines specific requirements for theory development: These requirements are highlighted as Conservatism, Uniqueness, Internal Consistency, Generalizability (and Abstraction).

## Tragic Conceptual Flaw 1: Conservatism and Poor Literature Integration

One key issue that is uniformly accepted as a primary foundation for theory-building by philosophers of science is: Theory only builds on previous theory. The closer empirical researchers can tie their research into and integrate existing literature, the more important an empirical article is. Sometimes researchers acquire data and find really important empirical results. What is tragic is if these researchers do not study existing research, they cannot integrate these empirical findings into the larger body of academic literature, making the research fact finding and not theory-building. This lack of integration is often caused by the empirical researcher not finding an exact match in the existing literature, so they assume that these findings are an entirely new theory. This violates the most fundamental property of 'good' theory: Conservatism. There is no theory that is entirely new since there are always some related research studies that must be addressed. Integrating these related studies is the most difficult task in research since it requires a deep understanding of exactly which research articles are most closely related to their empirical findings. Tying these articles together with the researcher's empirical research makes



### John 'Jack' G. Wacker

*is past chairman of the Iowa State University Management department where he is professor emeritus. Currently, he is a research professor in Supply Chain Management at Arizona State University. He has*

*taught in many international graduate programs in Europe, Asia, and Australia. He has published 45 journal articles in Journal of Operations Management, Decision Sciences, International Journal of Production Research, International Journal of Production Research, Journal of Marketing Research, International Journal of Production Economics and numerous other journals plus many more proceedings. His research has covered a wide variety of topics such as the use of theory for statistical methods, manufacturing implementation and forecasting. He remains on the editorial review board for Journal of Operations Management for the last 20 years. He has been an associate editor for the Decision Sciences Journal. He acted as president of the Global Manufacturing Research Group and has numerous international academic friends through GMRG.*

John.Wacker@asu.edu

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the article truly 'good' theory and 'good' theory-building empirical research.

***Tragic Conceptual Flaw 2:***  
**Poor Formal Conceptual Definitions That Cause Non-Uniqueness and Irrefutability**

The existing literatures in all academic fields have formal conceptual definitions. What is conceptually flawed is that empirical researchers often merely accept these articles' definitions without questioning whether they are 'good' formal conceptual definitions. Some of these definitions were formulated decades ago. As empirical research progresses, these formal conceptual definitions indicate many derived terms that are used for concept measurement. These derived terms make the formal conceptual definition more ambiguous or even worse, vague. Consequently, these terms are no longer unique and they violate a very fundamental property of 'good' theory: Uniqueness.

This lack of clarity and uniqueness causes the definition to become too broad. As definitions continue to be more inclusive, at some point these terms become so ambiguous or vague that they include innumerable concepts. When this happens the term includes so many concepts that it can never be proved nor disproved. These inclusions violate an important property of 'good' theory: Refutability. The more unlikely the events a theory predicts, the more important the theory is (Popper, 1957). In the operations management literature, the total quality management and just-in-time terms became so inclusive that neither of these theories could be ever refuted. The use of 'poor' formal conceptual definitions leads to poor theory due to poor irrefutability. One of the oldest sayings in the philosophy of science is: "Theory can only advance as fast as there are definitions to define it." Academics need a precise artificial language to express clearly and formally define their theories.

There is a related additional definitional confusion between formal conceptual definitions and measures. Formal conceptual definitions have many

possible measures (called in the philosophy of science informal or accidental definitions). For example, consider the term inventory turnover. The formal conceptual definition may be: "The number of times inventory is replaced during some specific time period." If an accountant is asked to measure inventory turns, the answer would be: cost of goods sold divided by average inventory. Consider next, a manufacturing facility needs to determine inventory turnover in a specific work center. The accounting measure is not useful since there is no cost of goods sold. However, using the formal conceptual definition, alternative measures can be used. Consequently, the formal conceptual gives guidance to a measure, while the accounting measure is not useful. In short, the formal conceptual definition is more important than the measure since it dictates which measures are acceptable to represent the concept.

***Tragic Conceptual Flaw 3:***  
**Internal Consistency for Statistical Significance and Substantive Significance**

Usually when investigating data, many statistical estimates include numerous variables that are derived from the literature and theory but also some additional variables added to investigate new concepts. Both types of variables are included and excluded in estimates using a variety of statistical techniques (most commonly stepwise regression or one of its many variants). Variables that appear in one estimate may not appear in the next estimate depending on the included variables and data set or sub-data set. A tragic conceptual flaw occurs when the research study emphasizes the statistical significance and explanatory power at the cost of substantive significance. Statistical significance is not as important as substantive significance. Substantive significance is derived from the existing theory and literature and causes estimates to have expected directions, which must be addressed in empirical studies. On the other hand, statistical significance has no expected direction and is merely an empirical relationship. Dropping a statistically insignificant substantive

variable and including a statistically significant in reported results is a tragic conceptual flaw since the significant variable was included for some theoretical reason. Whether an empirical result is important depends on the existing literature that provides internal consistency of the theory. So without the existing literature supporting the empirical results, the results become artifacts and the results become fact-finding (McCloskey & Ziliak, 1996).

It is appropriate to recall an old econometric saying: 'If a variable is important conceptually enough to be included in an estimate, it is important enough to stay in the estimate, regardless of statistical significance.' Reporting of insignificant substantive variables is important for extending theory that may suggest a variable may not be conceptually important.

***Tragic Conceptual Flaw 4:***  
**Simplicity and Statistical Overkill**

A major improvement in statistical research methodology has been the use of advanced techniques such as the many variations of structural equation modeling (SEM). Yet, use of these variations may suppress the importance of the results due to the prolonged discussion of the statistics rather than a prolonged discussion of the conceptual implications to the specific operations or business issue. With the large amount of statistics reported, the statistics are over-explained while the importance of the results is often not fully discussed. Many of the statistics should be put in an appendix or not reported at all. The APA task force on research methodology headed by Wilkinson concluded that:

The enormous variety of modern quantitative methods leaves researchers with the nontrivial task of matching analysis and design to the research question. Although complex designs and state-of-the-art methods are sometimes necessary to address research questions effectively, simpler classical approaches often can provide elegant and sufficient answers to important questions. Do not choose an analytic method to impress your readers or to deflect criticism.

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If the assumptions and strength of a simpler method are reasonable for your data and research problem, use it. Occam's razor applies to methods as well as to theories. (Wilkinson, L., et. al., 1999)

In short, keep the explanation of statistics to a minimal to provide space in the article for implications of the research. Empirical researchers can make the tragic mistake of over-explaining the many statistics and not emphasizing the important implications of the study.

### **Tragic Conceptual Flaw 5: Generalizability and Random Samples Obsession**

From the very first statistics class, beginning students are told emphatically that random samples are needed for population representativeness. This sample randomness assumption is frequently interpreted to mean that the sample is actually representative of the population on all dimensions. This assumption has a conceptual flaw. To understand this difficulty an example should prove useful. Assume that in the ideal world there actually was a random sample. Each sample has many dimensions such as respondents' innumerable characteristics (such as hair colors, length, placement on head, along with a myriad of other characteristics). Each one of these characteristics if used as variables could be related to the empirical issue. There are innumerable instances of sample characteristics causing the number of characteristic variables to be much larger than the finite sample. The likelihood that all the individual characteristics of the innumerable characteristics are *not* statistically significantly different than the population mean is zero. Therefore, a random sample is not actually representative of the population on all dimensions. On the other hand, one could define the sampling domain so narrowly that the data would more closely be representative of the population. But the narrow domain decreases the generalizability and the abstractness of the findings, which in turn, decreases where the findings can be applied. This conceptual flaw decrease causes the findings to be less important.

It is difficult to imagine that any sample is homogenous enough to expect exact replication of results. Data are always heterogeneous since there are a myriad of dimensions behind each sample. In any sample, there are more possible dimensions than there are sample items. Consequently, the control for all the dimensions is not possible. Yet research studies should control for those variables that empirically have been shown to be related to the research issue. Yet even when these variables are controlled, when an empirical estimate is carefully investigated for outliers using classical DFFITS, and DFBETAs, etc. in statistical analyses, there are usually some problems with specific observations. Naturally, there is an empirical reason causing the outliers and the model misspecification. The misspecification error may suggest the missing variable. However more typically, the outlier's cause is a mystery that can always be explained by some specious reasoning. Assuming the outlier is caused by a data reporting error and eliminating the outlier observation does improve explanatory power but is this actually the academically honest thing to do? Most studies could eliminate so many observations that the study will have high statistical significance (explanatory power) but low substantive significance. However, if the outlier data are omitted there is loss of information that may be important for future researchers. One solution for problem outlier(s) is to include them with qualitative variable(s) so that the statistical significance is preserved while acknowledging the data have some outliers. However, this method overstates the explanatory power of the estimates since the reason for the qualitative variable inclusion is not due to an a priori specific conceptual reason. Consequently, there is no simple method for handling outliers.

For research case studies there is a very challenging sampling problem for representativeness to the general population. This problem is ensuring that the observations are typical for more than just the observed case(s). Naturally, the

researcher needs great care to include the many characteristics of the case to ensure that research can be applied to wider environment.

In summary, all samples are heterogeneous and are subject to possible missing conceptual variables. What could cause a tragic mistake is to 'massage' the data to improve statistical significance at the cost of substantive significance.

### **Tragic Conceptual Flaw 6: Lack of Implications to Improve Business Practice**

Despite what some tenure committees may believe, the ultimate purpose of business research is to assist businesses in their decision making. Although some business research is focused on improving research methodology, the ultimate goal of business research is the actual improvement of business practices. Academic research is accumulated in academic textbooks to extend the research's application far beyond the academic journals. These textbooks are important for disseminating research findings. However, the original academic research helps businesses understand the complexity and simplicity of their strategic, tactical, and operational decisions. How to communicate academic research to the general business population is a major challenge.

Any academic that has consulted to businesses knows that definitions of business terms vary widely among organizations. To assist businesses in their decisions, great care must be taken when defining terms. Managers have many lay terms that have a very different meaning in the academic literature. Terms like competitive performance, value-added, sustainability, inventory balancing, commodity, quality and numerous others need to be carefully defined before venturing into a prolonged discussion with practicing managers. As academics, there are academic definitions of many technical terms. Researchers should explain the terms in lay business terms in an article's conclusions and provide implications to

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See POM, page 18

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## Conclusion

There are times when certain aspects of cultural differences, social and technological infrastructure, and the launch timing of technology release can be impediments for users in their level of acceptance of certain social networking sites. The relevant issues include privacy, ownership of information, interaction among users, sharing and distribution of information.

The information technology strategists should consider the dynamic and crucial role in which cultural difference, social and technological infrastructure, and timing of launches play in determining the users' acceptance or rejection of the technology. The author believes that future research should consider

the issues of privacy and trust for social networking sites. Most importantly, future research should look to expand the social networking topic to other regions to evaluate global social networking usage.

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POM, from page 12

assist managers in their understanding of empirical research. This use of common language will assist managers if they are interested in specific business issues since many managers will only read the conclusions of articles.

The most tragic flaw of all empirical research is for important academic findings to stay hidden in academic language and not become used to improve business practices.

## Conclusion

Theory-building empirical research using statistical and case analyses can easily have many flaws. The avoidance of poor literature searches, poor definitions, over-emphasis on statistics, over-reporting statistics, data massaging for randomness, and using only recondite academic terms are common problems that can be overcome with only slight modifications to procedures. In one sense, if carefully examined, all research has some tragic flaws since no research is perfect. Yet, the goal of business academics is to assist business managers in their decision making. It was with this lofty goal that this article was written.

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