Preparing a Replication or Update Study in the Business Disciplines

Rodger Morrison
Correspondence Author, Assistant Professor of MIS, Troy University, Montgomery Campus
136 Catoma Street, 2nd Floor, P.O. Drawer 4419, Montgomery, AL  36103-4419
Tel: (334)241-5431
E-mail: rmorrison@troy.edu

Tish Matuszek
Associate Professor of Management, Troy University, Montgomery Campus

Dennis Self
Associate Professor of Management, Troy University, Montgomery Campus

A Case for Developing a Replication Journal
In the study of natural science, there is a history of replication to validate, and more clearly define, theory. As a consequence, we have confidence that the scientific method has lead to veridical findings. Scientists have been able to able to build a strong foundation for making technical and medical progress because the findings are specific and reproducible. That is, they are predictable. In the natural sciences, there are only two possible outcomes: 1) success and 2) failure. Such specific outcomes provide a reliable and valid means of judging the direction of future research.

Conversely, business research is frequently grounded on a foundation that is notorious for change, namely, that of human behavior. As a consequence, much of what we believe that we know about behavior in organizations is based on small effect size and is often unrepeatable. We have no clearer evidence of this than the studies by Hertzberg (1966), a group of studies that many others failed to replicate but that still appear in many management textbooks.

More typically, rather than replicating theoretical work in the purest sense, support for theories is often generated through the use of meta-analysis, which can be defined as a “study of studies.” (Glass, 1976; Lipsey & Wilson, 2001.) By averaging the results of a number of studies on a particular subject, even though they would have been done using differing methodologies, differing samples, etc., the business researcher can draw conclusions supporting a particular theory or construct (e.g., Ng & Sorenson, 2008; Rhoades & Eisenberger, 2002). Strictly speaking however, a meta-analysis is not a replication study. In many cases, meta-analysis studies are simply averages of the results found in existing studies, rather than attempts to duplicate the results of a single study in particular.

One of the reasons for a lack of relevance to contemporary issues is that many of the theories that are currently used in business research have not been replicated in recent years, thus not accounting for environmental and social changes and the implications for these changes in predicting behavior and building ever stronger theory as a foundation for progress. There is clear evidence that social behavior has changed in recent years. For example, Tulgan (2004) specifies a number of changes in workplace behavior that occurred during a recent 10 year period, namely, shifts in the expectations of workers as more and more Baby Boomers retire and workers in the Generation X group become experienced managers.
To address the call for improving the relevance of business studies, the purpose of this paper is to build a case for increased support for research focused purely on the replication of prior research results, particularly for business related disciplines. This paper will briefly summarize some of the more significant advantages of research focused on replication in order to highlight the need for published replication research findings. Furthermore, because research results focused purely on replication is not often found in most business journals, this paper will provide a framework for researchers and journal editors to use when considering or evaluating replication studies.

**Why Replication Research is Important**

Because research focused primarily on replication has not been a strong focus in the behavioral sciences, a published list of reasons why this type of research is important has proven difficult to find. There are several obvious reasons, however, that require little more than common sense. Research focused purely on replication can identify phenomena that may have influenced earlier studies, such as bias due to the first researcher (Rosenthal and Rosnow, 1984; Rosenthal, 1991). This type of research can also be used as a looking glass into validity issues, methodology questions, and to improve generalizability. Pure replications are one of the strongest methods of building external generalizations and can be used to enhance external statistical validation. (Schwab, 2004) Successful replication strengthens reliability, establishes repeatability, or strengthens triangulation efforts. One key reason to perform replication studies is to verify unexpected or unusual research results. Nevertheless, to illustrate some of the many uses of replication research, it is helpful to provide clear examples of this type of research already published.

For example, Kimel, Benjamini, and Steinberg (2008) discuss the false discovery rate that can be problematic for factorial experiments. This study took a replication approach to strengthen and validate the results of an earlier study. Through replication, these researchers were able to find stronger effects than when using other methods. Their use of a purely replication focused structure alleviated spurious results that might otherwise have polluted the findings. They further discuss the implications for this type of replication in lessening the false discovery rate as an affect first identified by Benjamini and Hochberg (1995).

Rivkin (2001) discussed the importance of replication as it applies to organizational strategy. This discussion addresses the importance of identifying strategies that need to be replicated. That is, some strategies need to be replicated to maintain sustained competitive advantage. Similarly, Nicholson (2000) found that replicating an information systems study several times yielded different results each time. Multiple iterations resulted in findings that were more reliable than the original study. Szulanski and Jensen (2004) addressed the importance of replication through the use of templates to improve the stickiness of knowledge transfer. Templates facilitated knowledge transfer, by making knowledge transfer easier and more reusable.

Alpert, Kamins, Sakano, Onzo, and Graham (2001) use a replication study in a cross cultural application to assess the importance of pioneer brand advantage. They note that pioneer brand advantage is unlikely to be overcome by later entries into the market if the brand pioneer continues incremental innovation. They also note the impact of product churning, the continuous introduction of new products. They conclude that brand pioneer advantage is an important source of competitive advantage. This study indicates the importance of research purely for replication as a contributor to strategic advantage. Taken together, these studies begin to demonstrate the power of research that is focused primarily on replication as a means of improving a well known product or service.

**Why Include Replication Research in Journals?**

Mackey and Gass (2005) tell us that, “Replication is a central part of any field of enquiry.” (p. 21) Madden, Easley, and Dunn (1995) tell us that replication is good research, but also enumerate many of the difficulties in replicating social research and briefly discuss problems with replication studies in the social sciences as being isolated and not contributing to the advancement of knowledge. Madden et al
(1995) point out that there is a paradox with regard to social science research replication studies in general. Specifically, if a study does not replicate the findings of the original study, the researcher(s) will likely be viewed as not being true to the original study’s method. (Collins, 1992) Conversely, if the researcher(s) corroborates findings from the original study, they may be accused of not contributing to the growth and understanding of the discipline. Either way, given the current publishing environment, getting even a well-written study that focuses primarily on replication published is a daunting task.

There is clearly a void in the research environment, namely in the publishing realm, due to the lack of publishing opportunities for studies that focus primarily on replication and the lack of a tradition of expecting such studies as a part of the research paradigm. Also, because there is neither a publication outlet nor repository that focuses on research for the purpose of replication, in the social sciences, researchers who would benefit from the findings of such studies do not have sufficient access to them. Worse yet, many researchers have voiced concerns that “neglecting replication is scientific irresponsibility” (Smith, 1970, p. 971). At the very least, the sustained absence of available replication-focused research in a discipline may bring the “scholarly base of the field” into question (Darley, 2000; Muma, 1993).

Replication studies fill a vital need in research that is key to knowledge management, particularly knowledge transfer, in the social sciences. Replications enhance the likelihood that knowledge will transfer from one case to another (Kugler, Fischer, & Russell, 2006). Successful replications provide increased power to create precision in the application and measurement of theories. They enable researchers to continue to trust the replicated theory as a reasonable explanation of behavior or to further develop theory in a meaningful manner.

Replication facilitates the development of a simple and deep vocabulary that helps in the articulation of the essences of concepts often so complex that it would be naïve to expect others to fully grasp their importance after reading a single paper (Szulanski & Jensen, 2004). The clarity that comes from a well-developed vocabulary allows greater understanding and acceptance of critical concepts. This greater acceptance contributes not only to the improved diffusion of research literature into the research environment but also to the acceptance of the researcher(s) that authored the work(s). Replication provides a codification of knowledge and innovation that supports continued innovation by making information more accessible (Szulanski & Jensen, 2004).

Theories that are currently taught from university textbooks are often dated and may no longer contribute significantly to an understanding of contemporary business practices. Unfortunately, many of these theories have not been tested sufficiently through a focused replication; therefore, their generalizability to more contemporary business environments may be questionable. For example, Tulgan (2004) found evidence to suggest that subjects’ perspectives have changed over the courses of their lifetimes, suggesting that dated theory may not explain behavior as precisely as when it was first published. Replication serves to confirm the validity of theory to the contemporary research environment.

These are all valid uses for replication research. However, a brief survey of research databases suggests that there are no research journals available to the social sciences that focus specifically on research performed for replication purposes. As noted earlier, one is much more likely to find replication studies in the natural sciences or in fields that rely on natural sciences to inform the field. Currently, first mover advantage is available in the building of a journal that can be widely used by researchers to validate or update prior research.

In a world that is changing at an ever rapid pace, we have little reason to express confidence in theories that were tested when television was black and white, cell phones did not exist, and single income families were typical among the populations that were represented in the mainstream workplace. As the diversity of people and technologies burgeon, replication studies are one way to keep theory relevant to contemporary issues. Darley (2000) provides us with some valuable quotes by other researchers that emphasize that replication research is “one of the basic principles of competent research” (Kassen, 1960), “generic to all science” (Campbell and Jakson, 1979), and “one of the most
important criterion of genuine scientific knowledge” (Rosenthal and Rosnow, 1984). Furthermore, Muma (1993) said that replication research should be “adequately evidenced for any professional field that claims to be grounded on scholarship.” A more open-minded approach by journal editors to include research focused strictly on replication would fill an enormous gap in the research environment, thus making a major contribution to business research literature. Nevertheless, most business schools do not provide much instruction regarding how to write a research paper specifically focused on replicating prior research. Consequently, most journal editors are not accustomed to reviewing such works. Clearly, a review of how one should approach replication research is in order.

Preparing a Replication or Update Study

Over time, the definition of a replication study has changed considerably. La Sorte (1972) defined a replication study as a “conscious and systematic repeat of an original study,” and formulated a replication paradigm that outlined four major types of replication studies, along with sub types for each. His paradigm is outlined below:

I. Retest replication
   a. confirmation retest
   b. validity retest
   c. data measurement retest
   d. stability retest

II. Internal replication
   a. multiple independent samples
   b. single samples

III. Independent replication
   a. Empirical generalization
      i. validity
      ii. extension
      iii. specification
   b. theoretical generalization
      i. inter-societal
      ii. intra-societal

IV. Theoretical replication
   a. theoretical generalization
      i. inter-societal
      ii. intra-societal.

Note that in La Sorte’s paradigm, types I and II are replications found within a single study. That is, they refer to studies in which a researcher utilizes test/retest, cross-validation, or triangulation techniques. These types of studies are no longer considered true replication studies because they are part of a single study (Thompson, 1994). Types III and IV, however, refer to types of studies that are independent of the first study, or original study. Hubbard and Armstrong (1994) redefined a replication study as “a duplication of a previously published empirical study that is concerned with assessing whether similar findings can be obtained upon repeating the study.” This definition is closer to the definition held by many contemporary researchers in that replication studies are generally considered to be independent from first studies. Further, Darley (2000) notes that a replication with extension is “a duplication of a previously published empirical research project that serves to investigate the generalizability of earlier research findings.” As noted by Evanschitzky, Baumgarth, Hubbard, and Armstrong (2007), this definition of replication specifically excludes studies in which the writer(s) conduct repeated experiments within a single article, also known as an internal replication. La Sorte’s replication paradigm, while valuable in its time, no longer describes the types of studies often referred to as replication studies by contemporary researchers.
Building on Hendrick’s (1991) and Lykken’s (1968) classifications of replication studies, Darley (2000) goes on to describe four types of replication study: strict, partial, operational, and conceptual. A strict replication is just what the name implies. A strict replication is a replication study that closely adheres to as many aspects of the first study as possible. This includes, but is not limited to, the first study’s population, sampling procedure, experiment environment, measurement techniques, analysis methods, etc. Unlike the strict replication, a partial replication introduces change into one aspect of the first study. Replication with extension studies fall into this category and are often used to broaden the generalizability of earlier findings.

An operational replication does little to improve the generalizability of specific findings. Rather, this type of study is used to test whether the sampling and experimental procedures used in a first study are valid. An operational replication is, typically, focused only on replicating these aspects of a first study.

A conceptual replication replicates even less of the first study than does an operational replication. A conceptual replication is one in which a researcher wishes to confirm the findings of a first study, but develops a testing methodology independent of those used by the first researcher(s). In a conceptual replication, a researcher may confirm the findings of a first study using a completely different population, methodology, and/or analytical method.

Some empirical studies become dated with time such that some portion of the first study needs to be updated. For example, many valuable research works used survey instruments that worked well when the study was first completed, but have become dated due to changes in the research environment. Notably, many survey instruments of the 1950’s and 1960’s were written in third-person passive style, which may not be as suitable today as it was then, such as Rotter’s Interpersonal Trust instrument (e.g. Rotter, 1967). These instruments likely need to be updated to a more contemporary rhetoric in order to maintain their validity and/or reliability. Aspects of the original studies in which these instruments were developed would need to be replicated with update. The distinguishing characteristic that separates a replication with update from a partial replication is that an update study supersedes the original study and the latter extends it. That is, once the information is updated, it is assumed that the updated results more accurately generalize to the research environment, and are therefore more valid than the results from the first study.

While discussions of replication studies focus primarily on empirical research, there are also occasions when non-empirical works need to be addressed anew. For example, consider a research article in which the researcher provides detailed step-by-step procedures for accomplishing some software task, provides guidance for compliance with legislation, or perhaps summarizes the status of research within a particular discipline. Articles such as these are all valuable, and often can be accurately described as “research.” In time, however, the environment in which articles such as these were written may change enough to warrant an update to the first study. Articles such as these may be referred to as strict updates, because the first studies are simply updated with more information to account for permanent changes within a non-empirical research environment. These updated studies then supersede the results of their respective first studies. See Table 1 for a complete taxonomy of replication and update study types.

**Table 1:** Taxonomy of Replication and Update Study Types

<table>
<thead>
<tr>
<th>Type</th>
<th>Purpose</th>
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</thead>
<tbody>
<tr>
<td>Strict Replication</td>
<td>To duplicate a first study as closely as possible</td>
</tr>
<tr>
<td>Partial Replication</td>
<td>To extend the findings of a first study (improve generalization)</td>
</tr>
<tr>
<td>Operational Replication</td>
<td>To validate a first study’s methodology</td>
</tr>
<tr>
<td>Conceptual Replication</td>
<td>To confirm a first study’s findings through alternate methodology</td>
</tr>
<tr>
<td>Replication with Update</td>
<td>To duplicate an empirical first study, while updating certain aspects due to changes in the research environment. This type of replication supersedes rather than supplements the first study findings.</td>
</tr>
<tr>
<td>Strict Update</td>
<td>To update a non-empirical first study due to changes in the research environment. This type of replication supersedes rather than supplements the first study findings.</td>
</tr>
</tbody>
</table>
Identifying the Need for a Replication

Having identified what a replication study is, it is also important to provide some ideas on identifying the need for a replication study. There are several general reasons to perform a replication, the most obvious being that replication studies strengthen the research body. Confirming findings, improving reliability and validity, and improving generalization are all good reasons to perform a replication, and, generally, have obvious value. However, one reason to perform a replication that is not often considered is to improve the research process itself. For example, a researcher may identify a new sampling method that works better in a particular environment. Later, a replication researcher may perform an operational replication to confirm the choice of that sampling method. Another reason for performing a replication is as a teaching tool for beginning researchers. Under the watchful eye of an experienced researcher, strict replication studies provide students with the experience of having actually completed research without having to work through an extensive literature review, focusing primarily on the methodology. Because replication studies must be at least as rigorous and detailed as first studies, replication researchers must exercise discipline and adherence to a strict research protocol. This makes them ideal instructional tools when teaching research methods. Finally, there are times when a replication study contradicts the findings of a first study. In situations such as these, repeated replications are clearly in order and should be done before much research value is placed on the earlier findings. Obviously, research based on faulty findings is itself questionable. To avoid this, weak research must be strengthened and contradictions must be eliminated.

Writing a Replication Study Article

It is generally accepted in academia that certain aspects of research must be detailed in a well-written article. Replication and update studies are no different, although the nature of these works necessitates slight changes to what is presented in terms of what is emphasized. Nevertheless, as with other types of study, a well-written replication or update study should include an abstract, introduction, method description, results analysis, discussion, and reference section.

The abstract of a replication study, like a typical abstract in other types of studies, should provide a brief summary of the research. However, it should also include a statement that clearly states that the study is a replication or an update to a particular earlier study. A single sentence such as, “This study is a conceptual replication (or whatever type of replication) of a study by John Doe (year), titled (title)” is sufficient. The abstract should provide enough information so that the reader can identify the first study without using the references section of the replication study.

The remaining portions of a replication study are very similar to those in most any other well-written paper. The paper should begin with an introduction and literature review that provides the research context, summarizes relevant literature, and that clearly states any hypothesis. However, it is not necessary to begin from scratch and provide a complete literature review. Rather, the literature detailed in the first study should be summarized into only one or two paragraphs and be followed with an update of the pertinent literature that has been published since the first study. Following this brief review, a key component of any well-written replication study is support for why the replication is needed. It is absolutely essential to state clearly why the author feels a particular type of replication study is warranted. For example, if a replication is needed due to marginal instrument reliability in a first study, a replicating author should clearly state the initial reliability statistic, provide references that suggest that this statistic is marginal, and then state what a desired reliability statistic should be. Experienced researchers should immediately recognize that this portion of the literature review cannot be taken lightly. Depending on the circumstance, pointing out inadequacies in the research of others can be a very politically sensitive undertaking. Nevertheless, a published research work is what it is, and first authors should remember that imitation, or in this case replication, is the most sincere form of flattery. Replicating authors should remember that imitation, or in this case replication, is the most sincere form of flattery. Replicating authors should take great care to carefully word the justification section of a replication study so that the rhetoric focuses on the positive aspects of the contribution made by the
first study author(s) to the research area and that the replication study is meant only to strengthen that particular work. Journal editors should also scrutinize these comments carefully as well.

Likewise, if a first study was solid when it was written, say in terms of methodology or population, but later research shows that a different method or sample would yield stronger results; a conceptual or partial replication may be all that is in order. The literature review for this replication should clearly state any differences from the first study, and why the replication is warranted, to strengthen the results of the first study. Again, this portion of the literature review should provide support for why the replication is necessary and should provide sufficient theoretical support for any deviations from the first study.

The method section of a replication study does not differ significantly from that of any other study, with only one exception. The method section of a replication study should also clearly describe any differences between the replication study and the first study, even if only to state the effects due to the passage of time, use of a different sample, or unknown effects due to the presence of different researchers. In fact, these three issues are among the most important reasons to do the replication in the first place. Outcomes may change with time, with different samples, or when the researcher or method is changed. All are strong justifications for a replication study. As in any other well-written research work, a strong methods section should include enough information for a competent researcher to duplicate the research closely. That is, a replication study should be replicable.

As with the methods section, the results section of a replication study is similar to those found in most any well-written research work, with one exception. The results section must clearly note both similarities and differences between the results of the replication study and the results of the first study. Results reporting in a replication study, however, may contain information not found in the first study. For example, if a table in the first study provided test statistics only, it may be appropriate to provide test statistics, degrees of freedom, and p-values in the replication. Expectations of what is to be reported are generally held common among researchers, but they do change. As a minimum, researchers should report the content similar to that reported in the first study. Add to that what is commonly expected by other researchers, the journal the paper is being sent to, and what makes good research sense. Again, a well-written replication must provide at least as much detail as the original study.

The discussion section should juxtapose the results of the replication study with the results of the first study. The replication study is not to be considered independently; rather, the discussion should make it clear that it is an extension of an earlier work. From the moment a replication is begun, the two studies are to be taken together, even if contradictory results occur. The discussion portion of a replication study should identify the impact of the replication study on the research literature.

In the case of a strict replication, in which almost all aspects of a first study were duplicated closely, a very short discussion of only a few paragraphs might be in order. In a case such as this, it is imperative that a statement be present that clearly states whether or not the findings of a first study have been confirmed or not. A good example of such a statement might be, “The findings of John Doe (year) have been confirmed. Additional evidence has been found to support the hypothesis that (hypothesis)…” As in any other research study, this discussion should also include limitations, possible other causes of relationships between variables, validity issues, etc.

The remaining portions of a replication study are identical to those found in other studies. The layout, title page, reference section, appendices, tables, etc., should all follow the format for whatever style guide is being used, or for whatever journal or conference the replication is to be sent to for publication or presentation.

Other Considerations

Research ethics touches on many subjects, including human and animal experimentation, fraud, plagiarism, fabrication of data, whistle blowing, regulation, and more. Replication studies are no different in terms of ethics expectations. Editors, reviewers, teachers, deans, along with the authors
themselves, are no more or less obligated to abide by standards of ethics when completing a replication study than when completing any other type of study. However, because replication research begins with identifying issues associated with a first study, be they inadequacies or possibilities for strengthening, it would be relatively easy for a replication researcher to “grind an axe.” That is, replication works can be used to maliciously contradict the work found in a first study. This is both inappropriate and unprofessional. However, that is not to say that the contradiction of earlier findings or the identification of a severe limitation in a first study is completely inappropriate. If these issues exist in the research body, they should be identified publicly. Of course, there is a right way and a wrong way to do this. Those in leadership positions, especially editors and reviewers, should be particularly watchful for unprofessional writing in this area and work with authors to correct any issues. Authors, especially student authors, should be encouraged to emphasize the positive contributions of a first study rather than the negative.

Similarly, authors of first studies and of replication studies alike are expected to document any conflicts of interest that might exist or appear to exist. At times, such conflicts of interest are unavoidable. An experienced researcher, however, understands that it is not difficult to control for such issues. By inviting increased scrutiny by pointing out the conflict of interest, a researcher sets a higher standard of ethical behavior and is likely to be taken more seriously. Further, when these neutral third parties are invited as co-authors or are named within the article itself, along with a brief summary of how these third parties reviewed and participated in the research, many negative perceptions can be avoided. Furthermore, when such an increased standard of behavior is viewed by research leaders, they come to expect it. In the end, these same leaders incorporate these expectations into a new standard of performance for students and junior faculty just entering the researcher ranks.

Another area of ethics that is receiving increased attention, though not peculiar to replication studies, is the obligation of researchers to make research data available to others. A growing trend among research leaders is to expect data to be archived in a public repository, or at least to be made available upon request, so that results can be verified and easily replicated by others. Numerous public repositories are available, but researchers should begin with those at their university, organization, or the journal of publication. Ideally, a reference to the data repository where the study data is available should be clearly stated as a note in the replication study itself.

Conclusion
Unfortunately, research focused primarily on the replication of prior findings is rarely found in behavioral journals, especially in the business disciplines. Even more unfortunate is that replication is not an expected portion of a well-rounded researcher’s vita. This article outlines the primary reasons why an increased focus on replication research is in order, provides a list of the types of replication studies, the reasons for completing replication studies, descriptions for what is contained in each type of replication study, and an outline of the particular ethical considerations to be careful of when writing or reviewing replication research. This article has one sole task left, namely, to call for increased support from all those in the research environment for more well-written research that focuses on replication as its primary purpose. One only need to read the final paragraphs of most any well-written research article or dissertation to find the calls for specific replications. They only need to be answered.
References


