Working Paper: 0001

A CONTRIBUTION TO SCIENTIFIC KNOWLEDGE

A working paper

by JM Morrison, University of Stellenbosch Business School

2003

FOREWORD

by Professor Eon Smit, Director of the University of Stellenbosch Business school

It is an undisputed fact that the great business schools of the world are those institutions that not only transmit knowledge, but also **create** knowledge through academic research and **disseminate** the newly acquired knowledge to their stakeholders. A working paper series is one way of disseminating knowledge at an early stage of inception and of providing a test-bed for new ideas, work in progress or simply academic debate which has not yet reached full maturity. It is a means of allowing stakeholders to keep their 'fingers on the pulse' of current academic activity in an academic institution. I trust that this new initiative of Professor Hein Oosthuizen, head of the Doctoral Programme at the USB, will receive the support that it deserves as a showcase of the intellectual debate in the School and that stakeholders will not only benefit from the debate, but will become active participants in progressive business thinking.

ACKNOWLEDGEMENT

The culmination of research into an acceptable PhD dissertation is the all-encompassing consideration for the student. However, this outcome can only be reached after a long and often thankless research journey. This journey in itself is very lonely and the researcher continuously struggles by him- or herself to ensure that the research process will eventually make a contribution to the particular scientific field being explored. With this uncertainty in mind, together with the non-specific nature of the term 'contribution', one of the USB's PhD registrants, John Morrison, set himself the task to seek some clarity on the issue. His endeavour resulted in this working paper. We thank John for his effort and trust that this paper will act as a guide for others seeking the satisfaction of 'making a contribution'.

Prof Hein Oosthuizen
Head: Doctoral Programmes

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INTRODUCTION

The aim of scholarly research is to make a contribution to scientific knowledge. One of the foremost measures by which doctoral studies and publishable papers are judged is whether an adequate contribution has been made to existing knowledge. It is, however, not always obvious what constitutes an adequate contribution. Students, researchers and supervisors often battle with this question. Many business schools offer detailed guidelines to prospective PhD students about this aspect of their study. From time to time leading journals publish papers to assist researchers in judging their work for possible publication.

This working paper has been compiled from literature and aims to give some background to students, and to supervisors, to evaluate research ideas and research reports against the criteria of knowledge contribution. A number of crucial topics are addressed.

Firstly, there is a relationship between knowledge and theory. Theory-building is the essential path in the development of new knowledge. The creation of new knowledge is not accidental; i.e. a discovery that is made at the end of a research project. Knowledge comes as the result of a purposeful and systematic process aimed at bringing new understanding through the development and testing of new theories. To understand knowledge creation, one has to understand what theory is. Theory is the ingredient that turns observation into understanding.

Secondly then, the concept of theory is examined. Theory has a specific structure that resembles a model or system. It has characteristic building blocks, and it should answer pertinent questions that are common to most theories.

Thirdly, the paper addresses certain criteria that theory must adhere to. As examples, theory should have a utility value, and it must result from transparent experimentation capable of being replicated.

The paper finally pays attention to a number of other important aspects of theory, for example, the typical misconceptions of what theory is, and what is looked for in judging a theoretical contribution.

THE RELATIONSHIP BETWEEN KNOWLEDGE AND THEORY

Theory is the important link that turns data into knowledge (Handfield & Melnyk, 1998: 323). Data and information report on experience, the *what* has been observed. Theory explains *why* this has been observed, and *why* this is likely to be observed again. Knowledge is the resulting understanding created, and the capacity to act differently. Figure 1 illustrates this relationship.

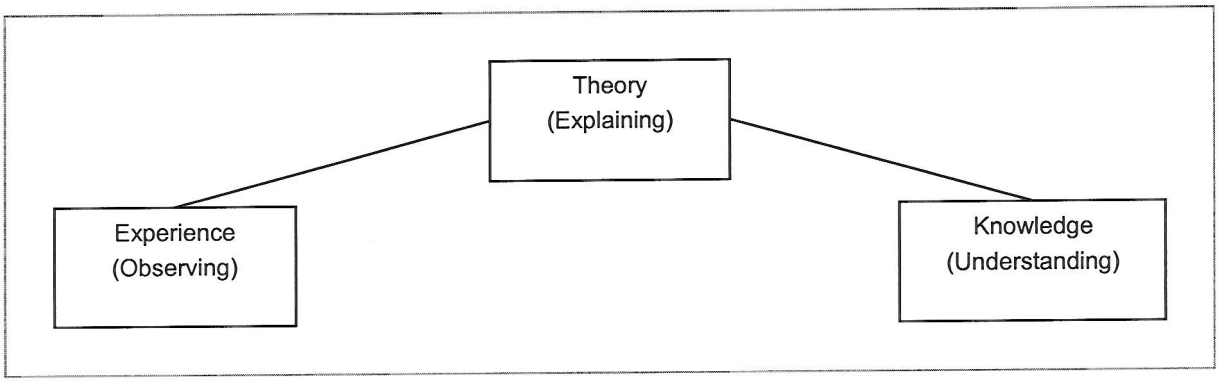

Figure 1: Knowledge and theory

Source: Whetten, 2000

To explore this relationship further, one needs to have clarity on what knowledge is. Pór and Spivak (2000) cite two quotations that are frequently used in the field of knowledge management to explain knowledge:

> Knowledge is information that changes something or somebody – either by becoming grounds for actions, or by making an individual (or an institution) capable of different or more effective action.
>
> – Peter Drucker

> *To conceive of knowledge as a collection of information seems to rob the concept of all its life... Knowledge resides in the user and not in the collection. It is how the user reacts to a collection of information that matters.*
>
> – West Churchman

Knowledge, therefore, is not simply a matter of content, but it is the capacity of content to bring about action, specifically more effective action. Knowledge is what links information to meaningful action by a user. Providing new knowledge is the capacity to change action or bring about new action. New knowledge should invite (if not convince) people to do something differently and better.

What then is scientific knowledge? Reynolds (1971: 3) describes scientific knowledge in the following way: "A scientific body of knowledge consists of those concepts and statements that scientists consider useful for achieving the purposes of science." Handfield and Melnyk (1998: 322) point out that scientific knowledge is concerned with phenomena that can be publicly observed and tested. They emphasise that the purpose of scientific knowledge and research is to bring answers to real life questions.

A body of scientific knowledge therefore can be seen as knowledge residing in the public domain and which is considered both useful and valid for understanding a particular study field by scientists in that field. Doing research is not to present information, but to use scientifically collected information to change or enrich the understanding of a particular science by its users.

The usefulness of knowledge is an important consideration. Handfield and Melnyk (1998: 322) make the point that, unless researchers provide managers with knowledge that is relevant to practical real life functioning, research will be of limited value. Reynolds (1971: 4) lists these criteria for knowledge to be of value:

- A method of organizing and categorizing, like a typology;
- Predicting future events;
- Explaining past events; and
- A *sense of understanding* about what causes events.

Knowledge develops through a systematic progression of theory building. Handfield and Melnyk (1998: 321) see knowledge as the result of three courses of action: the creation of new theories; the expansion of existing theories; and the disconfirmation of old theories that do not survive empirical scrutiny.

WHAT IS THEORY?

The concept of theory

Theory, in everyday speaking, is often erroneously believed to be something "theoretical", the proposal of ideas which must still be tested in practice. Reynolds (1971: 12) emphasises that the key to scientific knowledge lies in the fact that it is shared by scientists in the field. Ideas not yet tested and supported by empirical research, cannot be accepted and shared by other scientists. Empirical evidence convinces scientists to take cognisance of new theories. The untested views of researchers remain opinion and cannot be regarded as theory.

The perception that "any idea is 'theory' until it is supported by empirical data, whereupon it becomes 'fact' or 'reality'," is strongly rejected by Reynolds (1971: 11).

Likewise, Bacharach (1989: 512) rejects the belief that there are two streams of theory-making, namely *theory construction* and *theory-testing*. "The message to the theorist should be clear. If it is not testable, no matter how profound or aesthetically pleasing it may be, it is not a theory" (Bacharach, 1989: 512).

Bacharach (1989: 498) describes theory as a statement of *relationships* between *units* in the empirical world. Thus, a theory, firstly, is concerned with units that can be defined and observed in the empirical world, and secondly, these units are related in a way that can be observed in the empirical world.

The units of theory

In the world of theory creation, two kinds of units are studied, *variables* and *constructs* (Bacharach, 1989: 498).

Variables are units that can be directly observed and measured. Absenteeism is an example of a variable. It can be observed directly. So is the degree to which a manager allows subordinates to participate in decision-making. Although a little more abstract, it can still be directly perceived and rated on a scale.

Constructs, on the other hand, are units that are approximated. Leadership potential, for example, is a construct. Although it is a useful idea in the study of organizations, it cannot be adequately measured or rated by a single variable. Still, scholars believe that, by grouping a number of related variables, they give meaning to a concept which can explain the leadership potential of a young manager.

Over time scholars develop such concepts that they find useful for explaining a variety of abstract phenomena in organizations. These are constructs, or, as they are also called, latent variables. See, for example, Malhotra and Grover (1998: 410).

Constructs and variables could be of three kinds (Whetten, 2002: 56-57):

- *Explanatory constructs*: they are the constructs that explain the core construct of the study;
- *Explained constructs*: they are the outcome constructs, those that are explained by the core construct; and
- *Moderator constructs*: those constructs that, through their presence, moderate the relationship between other constructs.

The conceptual building blocks of theory

Whetten (1989: 490) states that theory comprises certain characteristic building blocks, which he describes in the following way.

The WHAT? of theory

These are the empirical units being studied, the constructs and variables. In a theoretical picture they will be blocks with certain definitions and descriptions, but in themselves they convey no knowledge.

The HOW? of theory

These are descriptions of which units are related, and how are they related. In the theoretical picture relationships will be shown by putting arrows between the blocks (the constructs and variables).

The WHY? of theory

Here two important aspects are addressed:

- Why have these variables been chosen, and why are they relevant to the study?
- What theoretical basis or set of rules explains the proposed relationships?

Thus, the choice of constructs and variables, and the reasons for the relationships have to be explained in terms of existing theory (nomological systems or theoretical generalizations). The fact that two variables are found to be

statistically related, means very little if the theoretical explanation why they are related is absent. "During the theory-development process, logic replaces data as the basis for evaluation" (Whetten, 1989: 491).

The WHERE, WHO, WHEN? of theory

These questions define the range of the theory, or as it is also called, the boundaries of generalization. They address questions such:

- Have the phenomena only be studied in a specific geographical setting?
- Did it only concern a specific organization type or industry?
- Is the study valid only for a specific time period?

In putting forward a particular theory, it is important to state explicitly the limitations and contextual factors that could have a specific influence on the findings and their potential to be generalised.

A structural system of theory

"The primary goal of a theory is to answer the questions of *how*, *when*, and *why*, unlike the goal of description, which is to answer the question of *what*" (Bacharach, 1989: 498).

Bacharach (1989: 498) states that a theory can be seen a "system of constructs and variables" linked by propositions and hypotheses. Figure 2 illustrates theory as a model within a systemic or structural perspective.

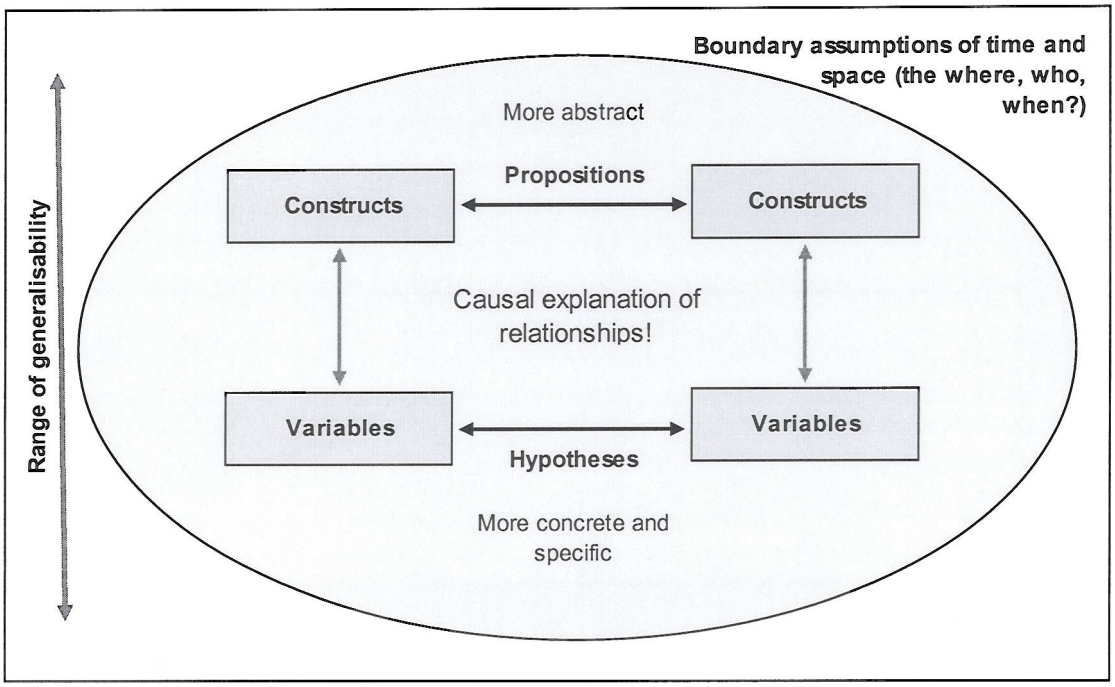

Figure 2: A model of theory as a system

Source: Adapted from Bacharach, 1989: 499.

The ***whats?*** and the **hows*?*** are illustrated by the blocks (the constructs and variables), and the arrows (the proposed relationships). At the lower more specific level, relationships are proposed as hypotheses between variables. At the higher more abstract level, the relationships are put forward as propositions between constructs.

The ***whys?*** of the theory must be added to the model as descriptive text to (a) justify the choice of variables and constructs, and (b) explicate the theoretical assumptions that explain the hypotheses and propositions (the relationships).

Finally the oval shape drawn around the model illustrates the boundary, the ***where, who, when?*** that delineates the study and suggests the range of generalizability.

Whetten (2002: 58, 60) also calls the latter two aspects (the ***whys?*** and the ***where, who, when?***) the *conceptual assumptions* and the *contextual assumptions* of a theory.

Conceptual assumptions mean the theoretical laws that have given rise to the ***whys?*** of the model. The contextual assumptions are the limitations, or intentional boundaries, within which the theory has been tested (the ***where, who, when***?), and which lead to the reservations and qualifications in generalizability.

PRINCIPLE CRITERIA WITH WHICH THEORY MUST COMPLY

Bacharach (1989: 500-510) states that theory has to meet two essential criteria, *utility* and *falsifiability.* Utility seems a reasonable stipulation, but falsifiability may at first appear unusual, considering theory to be thought of as the search for truth. Consequently, more light is shed on these two criteria.

Utility

By utility it is meant that a theory must be useful. Knowledge about something of no practical value can hardly be regarded as theory. To be useful and actionable a theory must both explain and predict. Explanation follows from the logical reasoning underlying the theory. Prediction follows from comparing the logic of the theory with empirical evidence.

Falsifiability

A theory must be so constructed that it is open to empirical disconfirmation. Enough conceptual and contextual detail should be given to open it up for contesting views. It must be possible to replicate the research, either to confirm or disconfirm the findings.

At least three issues are at stake here:

- What steps were taken to ensure that the variables were accurately and appropriately measured, for example, attention to research design, appropriate operational definitions of the variables, and reliability of variable measures within their constructs?

- How has construct validity been evaluated? Does the construct measure what it says it measures? Does it share variance with other constructs which are supposedly similar, and does it show sufficient discrimination from constructs it should be unrelated to?

- Have the relationships between constructs and variables been adequately specified to allow them to be subjected to critical evaluation. Researchers should present both logical adequacy, which addresses the need to be able to scrutinise the underlying logic, and empirical adequacy, which addresses the need to be able the replicate the research.

The issue of whether data are large sets of quantitative data, or qualitative data from case studies, does not change the principle. According to Bacharach (1989: 512): "No matter how the data are collected, researchers have the obligation to present them in a way that allows other scholars a fair chance at using and or disproving the data."

OTHER IMPORTANT CONSIDERATIONS OF THEORY

What is not theory?

Staw and Sutton (1995: 372-378), based on an assessment of papers in journals, expose some common misconceptions that many authors hold about theory. They consider the following as examples of what is not theory.

A presentation of *data* is not theory. The mere collection of empirical facts, the processing of data into classification schemes and even sophisticated descriptive statistics are not theory. They may be interesting and reveal patterns that have not been known before, but these convey no knowledge; they are information. Theory begins when there is some explanation why these patterns have been observed and why they should occur again. "Data describe *which* empirical patterns were observed and theory explains *why* empirical patterns were observed or are expected to be observed" (Staw and Sutton, 1995: 374).

The use of numerous *references* and *citations* also does not constitute a contribution to theory. Making use of widely acclaimed authors and theoretical statements is often mistaken as theory, but they only make a contribution when they are used in conjunction with a logical explanation and framework of arguments leading to the researcher's own propositions. "Authors need to explicate which concepts and causal arguments are adopted from cited sources and how they are linked to the theory being developed or tested" (Staw & Sutton, 1995: 373).

A *list of variables and constructs* on their own add very little to knowledge (Staw & Sutton, 1995: 375). Conceptual definitions and even empirical verification of their existence, although an essential part of a theory, do not alone pose a theory. Theory calls for explanations why variables are related, and explicit reasons why predictions can be made.

Often hypotheses and propositions (Staw & Sutton, 1995: 376) are put forward merely by *extrapolating previous findings*. These are important building blocks of theory, but on their own do not round off a theory. Without an intelligent and logical reasoning based on the underlying laws of the discipline, they add very little to understanding.

Explanation is the key word in theory-building, not only expectation and prediction. Expectation and prediction can be done simply by the observation of past empirical patterns.

An explanation rests on a nomological or theoretical generalization, or an intelligible pattern, but a prediction need not have such a basis ... We can give a reason for making some specific prediction rather than another, but we may be able to give no reason other than past successes for expecting the reason to come true.

– Kaplan (in Staw & Sutton, 1995: 377)

What is a valid contribution to theory?

A good theoretical contribution is something that adds in a meaningful way to existing theory or models. Whetten (1989) lists a number of points that should be considered in evaluating a theoretical contribution.

Modifying only a single element of an existing model is not enough. A valid contribution will normally address multiple elements of a theory – adhering to the quality of completeness.

Sometimes researchers present findings to substantiate that an existing theoretical model does not work in a particular context (perhaps a specific industry type). This in itself makes very a small contribution, but offering a logical reasoning why this anomaly exists and proposing revisions to the existing model to address these inadequacies do.

Similarly, just confirming that an existing model also works in a new context, where it has not been tested before, makes no contribution. Only if there is a sufficient *a priori* suggestion that it may not work, does it make a worthy contribution. The emphasis is on discovering that a model can be used in a different setting, not on merely reaffirming the use of a model. This will mean a qualitative assessment into ways of broadening the contextual assumptions of the theory, rather than "mere quantitative expansions" (Whetten, 1989: 493).

Parsimony

Bacharach (1989: 506-507) calls for the need to present parsimonious theories. The usefulness of a theory is greatly enhanced if it is concise and clear. Overly complex models are difficult to understand and apply. Still models should be complete and thorough and there will always be competing forces between parsimony and completeness (Whetten, 2002: 49).

Whetten (1989: 490) furthermore emphasises the need for theories to be comprehensive, as well as sufficiently economical to exclude variables that add little to understanding. Yet, he also recommends that researchers should rather, especially in the early stages of research, err on the side of including more variables. These could be refined through continued testing. Finally, he considers the ability to find the balance between parsimony and completeness to be one of the traits of a good researcher.

Common language

Bacharach (1989: 512) emphasises the use of a common language for constructs and variables. Too often researchers pay little attention to labelling their constructs in accordance with accepted and converging definitions of similar concepts.

Scientific writing is conservative. When arguing through descriptive paragraphs, monotony should be avoided by using synonyms and alternative phrases. Yet, there should be a general tendency to be precise, rather than colourful. Especially, as far as the key constructs and variables of a study are concerned, it is important to choose the most appropriate terms from existing literature, to define them unambiguously, and to adhere to these terms throughout.

Causality

Although the issue of causality (changing one variable causes the other to change) lies at the root of many proposed theories, it also remains a problematic concept, and at best hard to prove. Most researchers avoid causality altogether and rather refer to the correlation or association between variables. See, for example, Whetten (2002: 56).

SUMMARY

Theory-building is the essential path to creating new knowledge. The researcher that aspires to add new knowledge will do so by way of proposing and testing new theories.

Theory is not what is often commonly labelled as theory: mere published speculation or philosophy – even if proclaimed by renowned experts. Theory has a definite structure. It comprises variables, relationships between these variables, and a carefully explained logic underlying these relationships. Theory is also not an art of description; it is the art of prediction and explanation of relationships in the empirical world.

Theory must be useful to other scientists and practitioners in the field. For example, business school research must be useful to the management of organizations. A business school paper or dissertation should therefore conclude by relating its findings and theoretical contribution, to what value is being added to current practices in management.

Although scholarly writing should strive to be conservative and precise, it does not mean that theory is dull and uninspiring. The act of theory-building is an act of creativity, but it needs to be presented in a structured way so that it can be shared by other scientists. Karl Weick once referred to theory-building as a process of "disciplined imagination" (Whetten, 2002: 49).

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