



## Purposeful empiricism: How stochastic modeling informs industrial marketing research

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### ARTICLE INFO

#### Article history:

Received 30 December 2011

Received in revised form 19 January 2013

Accepted 21 January 2013

Available online 27 February 2013

#### Keywords:

Purposeful empiricism

Dirichlet

Stochastic modeling

Collaborative purchasing

### ABSTRACT

It is increasingly recognized that progress can be made in the development of integrated theory for understanding, explaining and better predicting key aspects of buyer–seller relationships and industrial networks by drawing upon non-traditional research perspectives and domains. One such non-traditional research perspective is stochastic modeling which has shown that large scale regularities emerge from the individual interactions between idiosyncratic actors. When these macroscopic patterns repeat across a wide range of firms, industries and business types this commonality suggests directions for further research which we pursue through a differentiated replication of the Dirichlet stochastic model. We demonstrate predictable behavioral patterns of purchase and loyalty in two distinct industrial markets for components used in critical surgical procedures. This differentiated replication supports the argument for the use of stochastic modeling techniques in industrial marketing management, not only as a management tool but also as a lens to inform and focus research towards integrated theories of the evolution of market structure and network relationships.

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### 1. Introduction

When asked why he robbed banks, Willie Sutton, a notorious bank robber, is reputed to have replied by saying “that’s where the money is”. The saying still resonates as an injunction to heed the most likely explanation. Indeed, physicians are taught “Sutton’s Law” as a warning to seek the most likely diagnosis first<sup>1</sup> (Chang, 2009).

What lessons does “Sutton’s Law” have for developing and integrating theory in industrial marketing management research? The search for a valuable contribution should start in the areas where that contribution is most likely to be found – to look for the banks. General theories seek to integrate middle level theories in order to explain a wide range of behavioral phenomena, independent of context (Hunt, 1983). This paper argues that well-established empirical regularities provide a starting point for integrating theory and form a solid foundation for higher level explanation – that is, they show us where the banks are. The observation of empirical patterns is an opportunity for guiding further research in order to uncover causal mechanisms and to “delve into the underlying processes so as to understand the systematic reasons for

a particular occurrence or non-occurrence” (Sutton & Staw, 1995, p. 378). When those same patterns are repeated in different contexts, industries, firms and relationships, then we have the basis for integrating the causal mechanisms over these different situations.

While it is entirely possible that similar empirical patterns may arise from completely different causal mechanisms in different contexts, we argue that the most likely solution starts from the assumption that similar phenomena have similar generative mechanisms and that integrated general theory is most likely to emerge from a research program guided by a common understanding of the ‘explananda’ and the nature of the theories that provide the explanations.

The early Industrial Marketing and Purchasing (IMP) research is an excellent example of “Sutton’s Law” in action. The original IMP researchers first located their bank – the emerging body of empirical evidence indicating the existence of stable long term relationships between individually significant buyers and sellers (Håkansson & Wootz, 1979). The empirical evidence arising from a study of almost 900 buyer–seller relationships across five European countries (Cunningham, 1980) provided the starting point for the research which resulted in the interaction approach (Håkansson, 1982) which in turn became the “most likely solution” at the heart of the IMP research program. As more researchers adopted the IMP approach, the theory became broader and deeper but at its heart it retains the principles of the interaction approach and the associated assumptions about the nature of buyers and suppliers and their network relationships (Ford & Håkansson, 2006).

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<sup>1</sup> We are indebted to an anonymous reviewer for helping us select the correct eponymous law – Occam’s Razor refers to the simplest outcome, with Sutton’s Law invoking the most likely outcome. While there may be overlap, there is no requirement for the most likely outcome to be the simplest.

In a similar manner, stochastic theories of consumer choice have emerged to describe, model and explain regular patterns of buyer behavior. Such patterns have been observed across a wide range of consumer markets, from packaged goods to durables (Uncles, Ehrenberg, & Hammond, 1995). Applied to organizational markets, established consumer modeling techniques can provide insights into the dynamic nature of the portfolio of relationships between buyers and suppliers. Analysis of the exchange behavior in multiple buyer–seller relationship dyads detects patterns of structural change and provides a market “norm” against which to benchmark individual relationships (Gadde & Mattsson, 1987). However, previous studies have focused on multiple category suppliers to a single focal firm (Dubois, Gadde, & Mattsson, 2003; Kamp, 2005). In contrast, the analysis in this paper presents a study of multiple buyers and suppliers operating in a single category, demonstrating the power of analysis of the macroscopic patterns of behavior to identify and interpret structural changes and the impact of these changes on individual buyer–supplier relationships.

This paper argues that in addition to describing emergent aggregate behaviors in an organizational purchasing context, the use of such models can direct further research and development of theory to explain behavioral phenomena that repeat across firms, industries and business types. We present two empirical examples that use a stochastic model to analyze behavior in public healthcare procurement. Our approach is to compare the patterns predicted by the chosen stochastic model with actual purchasing behavior. Different forms of market structure are characterized by different observed purchasing patterns, informing and guiding further research to help to uncover the structures and generative mechanisms that help explain the observed phenomena. The deviations between the model predictions and the observed behaviors can also be interpreted in terms of the assumptions underlying the stochastic model; this in turn provides insights into the nature of interactions in industrial markets. Our approach helps to address the problem of limited progress in attaining theoretical unity in the understanding of buyer–seller relationships and industrial networks through the use of a stochastic model as an integrating mechanism for theory development.

The paper is structured as follows. Following this Introduction, we provide an explanation of how purposeful empiricism helps integrate theory and hence “contributes to general theory development in industrial marketing research” (Peters, Pressey, Vanharanta, & Johnston, 2013).

In Section 2.1 we present a brief overview of the NDB-Dirichlet stochastic model (subsequently referred to as the Dirichlet) before examining in Section 2.2 how its core assumptions can be interpreted within a context of extended networks of long term interorganizational relationships in business-to-business markets (subsequently referred to as the markets-as-networks approach). Within this section we indicate how the Dirichlet provides a theoretical lens through which to view any market, focusing attention on large scale regularities that repeat across different contexts and so contributing to the goal of “attaining theoretical unity” in our understanding of buyer–seller relationships (Peters et al., 2013).

Two empirical examples are presented in Section 3 illustrating how the large scale patterns predicted by the Dirichlet provide a mechanism to describe market structures that can be discussed in terms of relationship interdependence and connectedness. The empirical data are taken from a three year longitudinal study of purchasing surgical consumables in a public sector collaborative procurement organization. The study identifies two management interventions designed to influence purchasing behaviors, one initiated by a supplier and the other by the purchasing organization. The analysis of the purchasing patterns before, during and after these interventions provides valuable insights into market making and the extent to which purchasing patterns can be changed within the constraints of an established network of relationships.

Section 4 discusses how the observation of regular patterns of purchasing behavior, and just as importantly, deviations from these regular

patterns can direct further exploratory and explanatory research to uncover the underlying portfolio of relationships, structures and generative mechanisms that give rise to the regular patterns, representing the purposeful empiricism in the paper's title. In contrast to blind empiricism and the development of theory in isolation, this purposeful empiricism directs the development of theory towards explaining empirical regularities that are replicated across different firm, business and industry contexts, with an increased likelihood of developing more unified theoretical understanding.

The paper proposes using the large scale regularities described by the Dirichlet as a guiding structure to direct and integrate further research. If phenomena repeat across different business contexts, the most likely explanation is that the phenomena have similar underlying mechanisms, thereby providing a basis for more general theory. The paper makes three contributions to the industrial marketing research literature. First, we present a highly differentiated replication of the Dirichlet in an organizational market where the patterns of buyer–supplier interaction are dynamic. Our second contribution is to show how the theoretical benchmarks predicted by the Dirichlet can deliver insights into changing market structures and thereby identify changes in the network of relationships. Our third contribution uses the empirical examples to demonstrate how the Dirichlet model provides a theoretical lens to focus analysis on specific situations. In particular, deviations from the Dirichlet benchmarks point to violations of the Dirichlet assumptions which in turn can direct analysis towards the underlying reasons for why the assumptions may not hold in specific circumstances.

## 2. With purpose – towards integrated theory

Theory provides explanation, demonstrates interconnectedness and posits causal mechanisms for observed behaviors and structures (Stewart & Zinkhan, 2006; Sutton & Staw, 1995). By extension, integrated or general theory explains a wider range of observed behaviors and structures, in particular by unifying data and empirical findings across different situations (for example, industry sector or business type) (Stewart & Zinkhan, 2006). Replicating empirical research in different contexts establishes boundary conditions for the findings and thus the range of conditions over which the theory is expected to hold, where the role of replication in the development of knowledge is succinctly described by Hubbard and Lindsay (in press).

However, the idiosyncratic nature of business organizations and their network relationships can make it difficult to select cases with common characteristics. To overcome this limitation we propose that the large scale patterns that emerge from the self-organizing behaviors of individual actors are used as the basis for selection of relevant research studies. If these patterns emerge in different situations, then it is this commonality that suggests the relevance of the patterns for directing further research (Downward, Finch, & Ramsay, 2002). Epstein (2008) calls these large scale regularities “*macroscopic explananda*” and describes how models that represent such patterns can capture “qualitative behaviors of overarching interest”, thus informing the conceptual foundations of their respective fields.

The approach used in this paper uses a stochastic model of the observed regularities as a theoretical lens to focus the analysis on individual actors and their relationships. As the regularities can be characterized by a well understood theoretical model, the exceptions to the expected patterns can be interpreted in terms of the explicit assumptions of that model (Epstein, 2008).

With its emphasis on the utilization of actual purchase behaviors, stochastic modeling has an inherently empiricist epistemology unlike the predominantly realist and interpretivist epistemologies that inform much industrial marketing research (Easton, 1995). It should be noted that stochastic models provide mathematical representations of observed phenomena rather than seeking causal relationships. As a mechanism for describing the “what” – the observed event, the stochastic

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