Grounded theory: an inductive method for supply chain research

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Abstract

Purpose – Development of theory remains an essential step in the evolution of supply chain management as an integrative business discipline. Supply chain research often involves phenomena possessing complex behavioral dimensions at both the individual and organizational levels. Such complexity can require the utilization of holistic and inductive approaches in order to more fully understand the behaviors associated with the phenomena. This paper aims to provide a step-by-step guide intended to increase researchers' understanding of the use of grounded theory (GT) methodology in supply chain contexts.

Design/methodology/approach – The paper argues for GT as an appropriate method for studying emerging supply chain phenomena using an inductive, holistic approach.

Findings – GT is positioned in a holistic framework of research methodologies. Next a step-by-step explanation of the grounded theory process is offered, illustrated by examples from the authors' own research.

Originality/value – This paper links the complex "system of systems" nature characteristic of supply chains to the need for a holistic research approach such as grounded theory. It also provides a guide for researchers, reviewers, and editors to judge sound GT. Moreover, from a practical perspective, the *in-vivo* nature of GT provides recognizable solutions to managerial problems.

Keywords Grounded theory, Supply chain research methods, Theory development, Research methods, Supply chain management

Paper type Research paper

Introduction

A broad theory capable of explaining and predicting supply chain management (SCM) phenomena is the first step in the evolution of SCM as an integrative business discipline (Lambert and García-Dastugue, 2006; Mentzer *et al.*, 2001; Mentzer and Kahn, 1995). Yet supply chain researchers struggle to define core supply chain theory (Defee *et al.*, 2010). This is not surprising as SCM represents a unifying discipline touching on all elements of business. Consider the Council of Supply Chain Management Professionals (CSCMP) definition of SCM:

> Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies (CSCMP, 2011).

This definition implies that a wide range of researchable phenomena, including strategies, processes, and functions fall within the domain of SCM. Supply chain research often involves phenomena possessing complex behavioral dimensions at both the individual and organizational levels. Therefore, research into SCM requires a method that understands inter- and intra-organizational systems as a whole.

The holistic, organizational, and inter-organizational focus of SCM extends the systems' theory of the firm (Drucker, 1962) toward a "systems of systems" (SoS) theory of the SCM network (Gorod *et al.*, 2008; Randall *et al.*, 2010). Classically, the systems approach linked internal firm logistics functions (e.g. inbound and outbound freight) to achieve lowest total cost (Poist, 1974, 1989). Modern SCM involves multiple interrelated firm and inter-firm processes of globally complex "SoS" (DiMario *et al.*, 2008; Lambert *et al.*, 2005; Muller-Merbach, 1994; Sauser, 2006; Sousa-Poza and Kovacic, 2008).

Modern supply chain complexity requires a research methodology that informs research as to how individuals interact within the whole. Grounded theory (GT) provides such a methodology (Glaser and Strauss, 1967), allowing for deep insights into social phenomena (Mello and Flint, 2009). GT provides researchers an understanding the human side of SCM – the underlying meanings in human experiences, interactions, and relationships that form company strategies and actions in a supply chain context. The GT approach integrates the system and the individual by providing a process that recognizes, categorizes, and relates key individual and organizational variables in a theoretical framework.

The ability of GT to address behavioral dimensions at the individual, organizational, and inter-organizational level is important. Supply chains are inherently social by nature; moreover, they are intrinsically interrelated, inter-organizational, inter-firm, and cross-cultural (Isenberg, 2008; Mello and Stank, 2005). This implies a broad behavioral backdrop that influences supply chain decisions and behaviors. Because of this, supply chain researchers must deal with complex and interrelated phenomena such as applications of power/dependence between firms, supplier negotiations, impacts of outsourcing on employees, customer service perceptions, and supply chain innovation as a social process (Mello and Flint, 2009). For the researcher, understanding how such phenomena impacts the system outcomes involves "interpreting" how supply chain managers perceive problems, react to changing business environments, and influence their business environments.

Unfortunately, little has been done in the SCM literature to succinctly explain GT methods or relate it to the study of complex system behavior. Few SCM empirical articles provide detailed explanations of the methodology and logic behind GT, and none lay out a standardized approach for applying and assessing GT. At the same time, GT researchers have a difficult time justifying their method to editors and reviewers who often lack the expertise to evaluate GT research. Oftentimes, GT researchers find themselves having to educate reviewers about GT methods and procedures. Part of this issue stems from the fact that there are foundational differences in GT research methodologies as well as different assessment criteria for GT depending on the model the researcher chooses to follow (e.g. Glaser, Strauss and Corbin, or Charmaz).

To address this gap, this paper provides SCM researchers with a guide for employing and assessing GT as a SCM research method. First, the paper offers an overview of GT success in supply chain research. Second, the paper provides a rational for GT as an appropriate method for studying complex SoS supply chain phenomena.

Third, the paper defines GT and outlines the GT process. Fourth, the paper provides a framework for authors, reviewers and editors to evaluate GT research. Fifth, GT concepts are explained and illustrated using examples from current research. Finally, a method for assessing the rigor and trustworthiness of GT research is provided and some of the limitations of GT are explained.

GT success in SCM research

GT has been used to develop foundational theory across a broad swath of social science disciplines (Bowen, 2008; Charmaz, 2006; Glaser and Strauss, 1967; Goulding, 1998). GT provides a method for emerging and relating key variables by uncovering the environmental and organizational structures and processes upon which organizations act (Bagozzi, 1984; Hunt, 1992; Locke, 2007). The success of GT has led to an increase in the number of SCM studies utilizing GT or GT analysis methods to explain SCM phenomena.

For example, Pfohl and Buse (2000) used GT analysis to investigate inter-firm networks, while Pappu and Mundy (2002) used GT methods to explore buyer/seller relationships in transportation from an organizational learning perspective. Haytko *et al.* (2007) combined phenomenological interviews with GT analysis methods to investigate issues facing the maquiladora industry in Mexico and the cross-border supply chain. Even more recent application of GT includes Manuj and Mentzer (2008), who used GT to explore the phenomenon of risk management and risk management strategies in global supply chains. Also, Thomas (2008) explored the phenomenon of time pressure in supply chain relationships using GT. Randall, Pohlen, and Hanna used GT to create a performance based logistics (PBL) theory grounded in service dominant logic (SDL). Lastly, Russell *et al.* (2009) applied GT analysis methods in their investigation of the integration of ethanol in the petroleum supply chain. GT is successful because it allows researchers to access to social and structural aspects of SCM that other methodologies may have difficulty uncovering. To explain how this occurs, the next section provides a detailed explanation of GT and why it works.

Rationale for GT in supply chain research

Science and logic suggest that understanding the whole requires rigorous questioning of its parts via the inductive method (Holland, 1992; Locke, 2007). GT is an appropriate and vetted method of inductive research. In SCM, rapid structural changes drive large-scale shifts. Such shifts include outsourcing of transportation, the increasing use of 3/4PLs and wholesale adoption of enterprise resource planning systems, along with internet-based, common-exchange formats and low-cost bandwidth (Koh *et al.*, 2006; Lieb, 2008; Maltz and Ellram, 1997).

SCM is based in the systems theory of the firm (Drucker, 1962). Modern supply chains, global supply chains have increased in complexity and can only be understood from a SoS perspective (Gorod *et al.*, 2008). GT provides a research methodology to understand phenomena against the backdrop of the larger system (Sousa-Poza and Kovacic, 2008). This holistic SoS view sees SCM as a complex and adaptive discipline involving systems within systems that span multiple firms, economies, and cultures (DiMario *et al.*, 2008; Lambert *et al.*, 2005; Meixell and Gargeya, 2005; Muller-Merbach, 1994; Sauser, 2006; Sousa-Poza and Kovacic, 2008). The macro and interrelated nature of SCM presents methodological issues that enable comprehension of the whole through study of its parts difficult:

All complex adaptive systems involve large number of parts undergoing a kaleidoscopic array of simultaneous nonlinear interactions. Because of the nonlinear interactions, the behavior of the whole system is not even to an approximation a simple sum of the behavior of its parts. The unusual mathematical techniques of linear approximation – linear regression, normal coordinates [...] and the like – make little progress in the analysis of complex adaptive systems [...] (Holland, 1992, pp. 184-5).

SCM represents a complex and adaptive organizational system. By understanding how organizations adapt, researchers can understand the rules and environmental forces shaping that adaptation (Holland, 1992).

As business environments change (e.g. September 11th, volatile fuel prices, economic downturns and upturns), human systems adapt to those changes. GT uses an aggregate, inductive, and pattern-seeking process to relate behavior to higher-level concepts (categories and properties) within a theory building framework (Charmaz, 2006; Glaser and Strauss, 1967). Thus, GT goes beyond description to develop categories with dimensions (e.g. high or low knowledge awareness, high or low adoption of innovation) and then posit relationships between these categories (e.g. knowledge awareness influences the degree to which innovation is adopted). By proposing such relationships, GT builds theory that can be tested using quantitative methods, leading toward broader generalization.

In GT, researchers conduct research without a priori constructs, allowing them to let concepts emerge from the data rather than being constrained by previous theory. GT uncovers the behavioral dimensions in SCM research as GT provides researchers with a method to collect and interpret data from personnel at various levels and functions within and across firms. This direct contact gets at core processes underlying SCM in practice. GT works because it uses a holistic and process-oriented method to determine the rules, processes, and strategies upon which supply chains operate (Glaser, 1978; Holland, 1992; Mello and Flint, 2009).

The following are examples of research questions that GT may be particularly well suited to answer:

RQ1. What are the appropriate managerial mindsets in order for collaborative relationships between supply chain members to be successful?

RQ2. What are the issues that must be overcome in order for firms to enact inter-firm information sharing?

RQ3. How is corporate culture related to SCM practices?

RQ4. How do firms cope with disparities of technical, financial, or human resource capability between themselves and other supply chain members?

RQ5. What are the impacts of mergers and acquisitions on the SCM practices of involved companies?

RQ6. In what ways does a company's supply chain orientation affect its boundary-spanning employees?

While by no means all-inclusive, this list illustrates the type of phenomena suited to a GT study.

What is GT?

GT is an exploratory, observational research technique used to understand phenomena about which there exists little theoretical knowledge (Locke, 2007; Suddaby, 2006). GT creates a holistic and inductive understanding of phenomena based upon the view of the participants (Charmaz, 2006) and an interpretive analysis of data obtained in the field (Goulding, 1998). This methodology differs from quantitative approaches that deductively test theory based upon a priori assumptions.

The analytical engine of GT is a process known as "constant comparison" (Glaser, 1978). Constant comparison seeks to identify theoretical similarities and differences between the perceptions of participating individuals. These contrasting perspectives allow the development of higher order concepts that explain behavior (Gephardt, 2004; Glaser, 1978). The key to constant comparison is "theoretical sampling", which is a method for gaining multiple perspectives of phenomena. Grounded theorists select a sample that is rich in the phenomena under investigation (Charmaz, 2006). This sample provides data from which to reveal concepts (categories and their properties) in support of inductive theory development. This sampling approach contrasts with quantitative methodology where the sampling goal is to support statistical generalization. Grounded theorists validate emerging categories and relationships by comparing findings from one sample to a new sample selected specifically to confirm or disconfirm the previous propositions. Categories are abstract, higher order concepts that represent groups of underlying codes sharing conceptual content. Theoretical sampling may involve:

- comparison of concepts articulated by study participants based upon a single interview;
- comparison of interviews with multiple participants;
- comparison and review of field memos;
- comparison with organizational artifacts such as meeting minutes, awards, and appraisals; and
- comparison with relevant literature (Charmaz, 2006; Glaser, 1978).

Good GT is therefore a "set of well-developed concepts related through statements of relationship, which together constitute an integrated framework that can be used to explain or predict phenomena" (Strauss and Corbin, 1998, p. 22).

Using the constant comparison process, the researcher develops a theoretical framework built upon categories, properties and relationships (Cho and Trent, 2006). This framework explains and predicts the majority of the behavior in a phenomenon. These theories can be verified through quantitative hypothesis testing.

Placing GT in perspective with other approaches

To understand GT it is useful to understand where GT resides in perspective to other research methodologies. Burrell and Morgan (1979) and Meredith *et al.* (1989) describe academic research paradigms as continuums. These continuums represent the philosophical paradigms of the researcher and discipline (Burrell and Morgan, 1979; Hunt, 1992). They can range from positivist on one extreme to relativist/interpretivist on the other (Figure 1).

Positivists stress objectivity, generality, replicability, and casualty through falsification (Hunt, 1990, 2002; Popper, 1959). The positivist perspective emphasizes
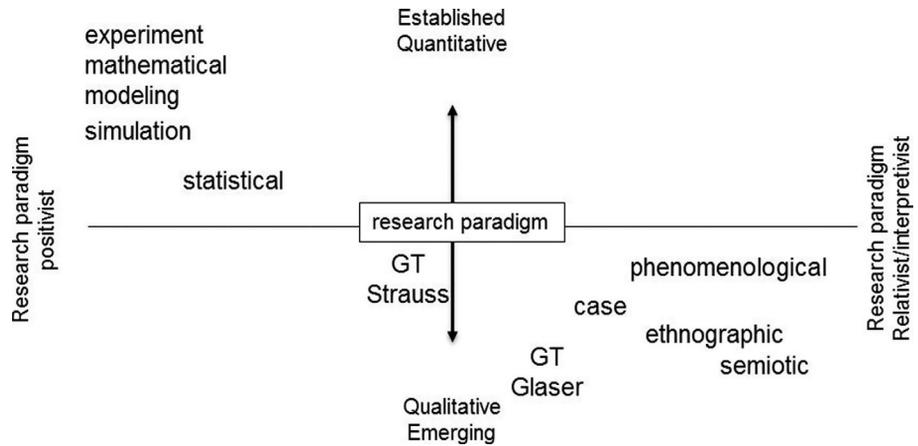
Figure 1.
The continuum of research
paradigms

Source: This figure is a derivation of a previous work published in Randall *et al.* (2010)

precise, probabilistic theories aimed at explanation and prediction (Hunt, 1992). This paradigm includes the realist and scientific realists (Hunt, 1992) along with the meta-theory developmentalist (Bartels, 1970). Examples include falsification (Popper, 1959), experimentation (Campbell and Stanley, 1963), mathematical modeling and linear programming (Bender, 1981; Kuehn and Hamburger, 1963), simulation (Shycon and Maffei, 1960), and statistical approaches (Bagozzi and Yi, 1988; Hair *et al.*, 2010).

At the other end of the continuum reside the relativist and interpretivist. These researchers, such as Anderson (1983) and Hirschman (1986), emphasize description rather than prediction. Interpretivists rely on qualitative methods. The relativist/interpretive perspectives include ethnographic (Belk *et al.*, 1988; Mcgrath *et al.*, 1993), semiotic (Holbrook and Grayson, 1986; Mick, 1986), case-based (Eisenhardt, 1989), and phenomenological approaches (Thompson *et al.*, 1990). In general, the relativist/interpretivist seeks to understand the environment from the perspective of the individual. These researchers accept that individuals shape their environments, and individual perceptions influence the causal structure of their environment.

Between the positivists and the relativist/interpretivist lie the GT objectivists and constructivists. Grounded theorists are more positivistic in their qualitative approach with a focus on explanation and prediction. For Glaser and Strauss (1967), a theory is "an integrated framework that can be used to explain or predict phenomena". Charmaz (2006, p. 131) terms this approach "objectivist grounded theory", one that "assumes an external reality awaiting discovery and an unbiased observer who records facts about it".

The GT constructivists reside between objectivists and relativists; they assume that:

- participants construct meanings specific to contexts of time, place and culture; and
- that researchers themselves may interpret meanings based on their own values (Charmaz, 2006).

Constructivist GT researchers raise categories to high-level theoretical concepts. However, for objectivists these concepts become core variables that "serve as interpretive frames and offer an abstract understanding of relationships" (Charmaz, 2006, pp. 139-40).

This movement towards abstract understanding places this approach on the relativist/interpretivist side of the continuum (for a more detailed discussion of the differences, see Mello and Flint (2009, pp. 115-21).

Like most qualitative analysis methods, GT resides toward the relativist/interpretivist end of the continuum. Yet GT's pattern-seeking, theory building focus set it apart from other qualitative methods. GT researchers eschew simple description for its lack of theory development, contrasted with ethnographers, who rely heavily on description to convey the essences of cultures, existential phenomenologists, who produce clear and accurate descriptions of a particular aspect of human experience (Thompson *et al.*, 1990), or semioticits who analyze the structures of meaning-producing events, both verbal and non-verbal, but do not seek to develop theory in the manner of GT (Holbrook and Grayson, 1986; Mick, 1986).

GT is close to case studies in that both GT and case study researchers typically combine a variety of data collection methods gathered in a field setting to yield theory (Eisenhardt, 1989). While GT generally relies on qualitative data and data analysis techniques, its focus on perception, repeatability and follow-on hypothesis testing suggests that GT straddles multiple research paradigms.

The GT process
This section provides a step-by-step overview of the GT process. Figure 2 shows the GT process as a two-dimensional flow that moves back and forth along this process to compare concepts articulated by study participants. The iterative, overlapping and dynamic nature of GT is shown using the arrows in Figure 2.

The research problem, initial question, and sample
Step 1 involves defining the research problem, developing the initial research questions, and identifying the sample. During this step the literature should act like a lens that focuses but does not constrain the research (Charmaz, 2006; Glaser, 1978, 1992). For example, in an investigation into supply chain innovation and culture, one of the authors delved into inter-company relationship literature to gain theoretical sensitivity on inter-firm governance procedures. In another study, one of the authors considered how SDL, a new marketing framework, might provide insight into the success of PBL. Once the investigation began, the researchers set the literature aside.
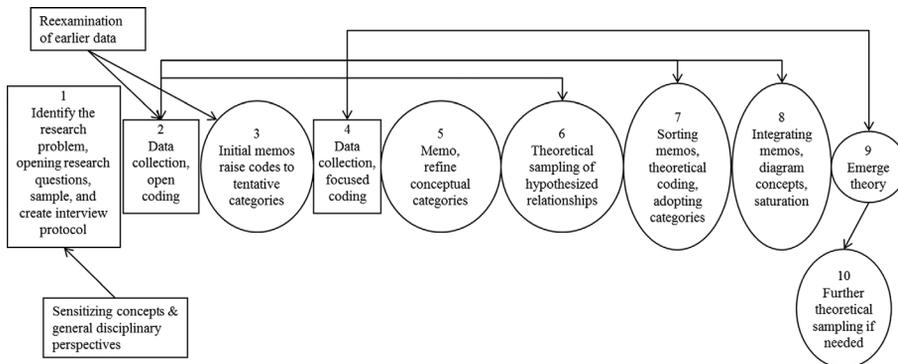
Source: Adapted from Charmaz (2006)

Figure 2.
GT process

This allows concepts and relationships to emerge from the field data unconstrained by the literature (Charmaz, 2006). The second element of step 1 involves having industry personnel and academic experts clarify the research questions and validate the initial sample. During this phase the sample is critiqued for:

- appropriateness; and
- as a foundation for theory development (Charmaz, 2006).

Next the researcher begins to code and uncover variables. These variables may be familiar from a research perspective. The strength in the grounded approach is that these variables are often related in new ways or to new variables (Glaser, 1978). Thus, reviewers and authors may recognize these variables and must caution themselves not to assume that nothing new has been found. This process differs from the use of literature develop a priori constructs to be tested.

Open and focused coding

At steps 2 and 4, interviews and other forms of data are collected. GT requires dimensionality; this means that phenomena need to be seen from various aspects. The sample in GT requires perceptions from personnel in different organizations at varying management levels. The objective of this sampling procedure is to gain varying perspectives on the phenomena under study. For instance, the idea of access from an information technology perspective in an SCM setting can only be assessed if the researcher interviews multiple SCM partners from multiple locations and multiple tiers of the supply chain.

Typically, interviews are recorded and transcribed verbatim. This process ensures that nuances missed by less exacting methods, such as tone and certainty, are maintained and incorporated into the findings. The interview words, sentences and paragraphs are coded using open and focused coding (steps 2 and 4). Open coding (sometimes called initial coding) breaks down data into meaningful units that are later reassembled into higher-level concepts (Strauss, 1987). The researcher analyzes the transcript line-by-line to identify "key words or phrases which connect the informant's account to the experience under investigation" (Goulding, 2002, p. 76). During open coding, similarities and differences are compared and grouped together into abstract concepts or categories (Glaser, 2001). Focused codes are used to distill and aggregate emerging concepts into categories and properties during step 7.

To illustrate, consider a sentence transcribed during one of the author's research projects (Randall et al., 2010): "Improving performance requires knowledge, and that means we have to have information systems to transfer that knowledge." The participant considers knowledge to be an element of improved performance, and improved performance and knowledge are related to information systems. That sentence may therefore be coded as "performance", "knowledge" and "IT system". In addition, theoretical codes and memos may be taken to remind the researcher to determine if there is a pattern of relationship linking "knowledge", "information systems" and "performance" in subsequent interviews.

Memos

Documenting the logic behind codes and emerging categories is central to establishing validity in GT. GT uses a process called memoing (steps 3, 5, and 7) to capture the

thoughts and decisions that lead to category emergence. Memos capture hypothesized relationships, provide a record of how these relationships developed and create the logic for subsequent interviews.

Memos provide the logic and process through which the GT emerges (Charmaz, 2006). Memos help researchers:

> [. . .] a) to grapple with ideas about the data, b) to set an analytic course, c) to refine categories, d) to define the relationships among various categories, and e) to gain a sense of confidence and competence in their ability to analyze data (Charmaz, 1998, pp. 517-18).

Memos are also used to capture ideas concerning what directions the researcher should take next (Charmaz, 2006; Glaser, 1978; Strauss and Corbin, 1998) and to trace the development in thought processes regarding categories over the course of the study. Memos serve as an audit trail, providing validation of how researchers arrive at their conclusions. For example, one of the authors developed a figure depicting the evolution of concept development from open coding through final theory based on memos dealing with theoretical sampling and category development (Mello and Hunt, 2009). These memos, written during the data analysis phase, contained thoughts concerning what types of companies and which individuals within those companies could further the theoretical sampling process, potential categories and properties, and the linkages between category/property development and existing theory in the literature.

Theoretical sampling

In step 6, GT researchers engage in a process called theoretical sampling. Theory sampling involves looking for statements, events or cases that illuminate dimensionality as well as positive and negative instances of categories (Charmaz, 2006). For example, in a study of control dealing with third-party logistics providers, one of the authors sought samples that provided different power/dependence relationships to understand the dimensional ranges of control. This sampling approach illuminates the various aspects of the emerging variables (e.g. low/high dependence) and their theoretical relationships (Charmaz, 2006). By seeking theoretical similarities, differences and relationships to other concepts, theoretical sampling evolves and relates concepts into higher order categories that explain and predict behavior (1978).

Constant comparison

New interviews lead to new insights that often themselves suggest a need to reinterpret previous codes and categories. The process of moving back and forth between the activities shown in Figure 2 and comparing emerging concepts with those already uncovered forms the analytical engine of GT. This process is called constant comparison. In GT the researcher relies on interviews and other forms of data collection (e.g. observation, company records) to provide comparisons between different individuals, companies and events. Participants are selected based on their ability to inform emerging categories and properties.

Constant comparison relies on theoretical sampling as researchers pursue subsequent interviews, reexamine previous interviews, and pose and answer testable hypotheses. Specifically, the researcher proposes a relationship based upon one set of interviews, observations and other forms of data, and then tests that relationship through follow-on interviews and data collection activities (Charmaz, 2006; Glaser and Strauss, 1967).

Constant comparison provides a rigorous, process-oriented approach that illuminates theoretical structure (Cho and Trent, 2006; Glaser, 1992). Using constant comparison, the GT researcher uncovers repeatable patterns and tests those relationships using theoretical sampling. The repeatability of this process, albeit without the use of statistical methods, sets GT apart from other qualitative methodologies.

Sorting and adoption of categories
As shown in step 7, new interviews fill out categories and lead to increasingly focused follow-on interviews and data collection. Categories, with their explanatory memos, are sorted into theoretical structures (Glaser, 2001). The focus is now on codes that relate one category to another and on finalizing the adoption of categories (see Randall *et al.* (2010) for an overview of this process).

Saturation and diagramming
In step 8, categories are refined, and theoretical relationships between the categories are made. Often GT researchers build a framework at this point of the process. Such frameworks relate antecedent categories (the left side of a diagram) to processes (the middle) and outcomes (the right) in a logical fashion. However, not all GT diagrams are constructed in this manner. Some GT diagrams show the interrelationships of concepts without placing them within a linear framework, since not phenomena proceed in a linear fashion.

The process of constant comparison provides crisp categorical definition and relationships as the theory emerges (step 9). As the research progresses, the theory becomes more dense and complex, and the categories and their properties become conceptually saturated. Theoretical predictions are validated within the study using theoretical sampling, which eventually leads to theoretical saturation (Charmaz, 2006). Theoretical saturation occurs when follow-on interviews fail to add to existing categories, properties, processes, and relationships (step 10).

Theory emergence
The end result of theoretical saturation is the theory. The theory depict relationships between categories and the phenomenon (e.g. the effect of the category on organizational or individual behavior), macro conditions affecting the phenomenon (e.g. government regulations), structural conditions within the phenomenon (e.g. channel structures), and other important aspects of the theory. Diagrams are useful to the researcher because they:

  · integrate all of the emerging concepts from analysis of the data into a formulated theory; and
  · present the findings of the research in a concise manner.

The goal of GT is to present an integrated model explaining most or all of the behavior associated with the phenomenon under investigation (Glaser, 1978).

Assessing GT research
GT has established methods of assessing rigor and trustworthiness. However, unlike other methods such as regression analysis and its associated r-value, GT lacks a concise measure of validity. To assist authors defending their work and reviewers/editors

evaluating such work, we outline assessment criteria common to good GT research. Glaser (1992) maintains that there are six key criteria for evaluating GT studies. Those six criteria are: fit, workability, relevance, modifiability, parsimony, and scope. Strauss and Corbin (1990) establish criteria for judging the adequacy of the research process and the empirical grounding. They suggest a study should include fit, understanding, generality, and control. Charmaz (1998) identifies credibility, originality, resonance, and usefulness as potential criteria for judging the effectiveness of the GT research.

Table I organizes these criteria into general headings and suggests ways by which reviewers, editors and readers can analyze the quality of the study. Several of the criteria are essentially the same in concept but have been identified in the literature using different terminology. It is our position that regardless of the approach a GT researcher takes (e.g. Glaserian, Straussian, or Constructivist methods), the same set of criteria can be used to judge GT research. These criteria include rigor, trustworthiness, contribution to practice, and contribution to theory.

The problematic side of GT

As with any research methodology, GT has downsides, and we would be remiss if we did not include their discussion. GT greatest drawback is its interpretive nature. Potential bias is always a threat to the validity of interpretive findings, and therefore such findings can be subject to criticisms of researcher bias. For example, it could be argued that other interpretations of the data may better explain the phenomena. Also, because interviews are often open ended, participants have more control over the process than in quantitative methods. This openness means that if the researcher is not careful, participants may take interviews in directions of their own choosing. In addition, researchers have limitations in their ability to interpret data. An important issue could be overlooked if the researcher does not have theoretical sensitivity in that area (Glaser, 1978).

Another issue relates to the theory-building, rather than theory-testing, nature of GT. A generalized validation of theoretical concepts and relationships cannot be claimed by the GT researcher. Such generalization requires empirical investigation using methodologies different from GT. Due to the relatively small sample size and selection of participants typically found in a GT study, findings cannot be easily generalized beyond the contexts and firms within the study.

A third issue revolves around the fact that reviewers are often unfamiliar with GT processes and terminology. This does not necessarily mean that such reviewers are hostile to GT, only that they cannot easily determine how well the research was conducted. This puts the burden on the researcher to explain how the method works, what process was followed, and what steps were taken to ensure that the research was conducted with rigor.

Additionally, from a research practicality standpoint, GT can be problematic. First, since the data are obtained in field settings, the researcher's physical presence is required to gather most, if not all, of the data. This often requires the researcher to spend resources traveling to participating companies. For example, one of the authors spent a full month in a foreign country conducting interviews with participants. The other author spent weeks at various domestic manufacturing plants conducting interviews, sitting in on meetings and reviewing archival data.

Second, the data analysis methods used in GT are time consuming. Open coding of interviews and the constant comparison of emerging concepts requires large amounts of

Heading	Definition	Evidence of compliance
Rigor		
Fit (Glaser, 1992; Strauss and Corbin, 1990)	How well the categories and their relationships correspond to the reality of the area being investigated	(1) Content experts independently analyzed the researcher's interpretations, processes, and memos. (2) Participants were asked to review these interpretations and comment as to whether or not the summaries accurately reflect the participants' meaning. Interpretations from these sources were discussed and reconciled with researchers' interpretations
Modifiability (Glaser, 1992)	Both positive and negative incidents are handled within the theory. Modification of the theory is required in order to accommodate new concepts discovered by comparing findings across people, places, and time	Researchers kept an audit trail that shows how and why the theory was modified. This audit trail can be maintained through theoretical memos, figures detailing the evolution of the theory, memos embedded in coding software, and other types of records
Resonance (Charmaz, 2006)	How well the categories reflect the fullness of the studied experience	Participants were asked to determine the extent to which the resulting theory makes sense and offers them deeper insights about the phenomenon. Researchers took feedback into account in findings
Trustworthiness		
Credibility (Charmaz, 2006)	Strong logical links exist between the data, its analysis, and the resulting theory; findings appear to represent the data well	(1) There is evidence of the use of theoretical sampling to select participating organizations and individuals. (2) There is evidence that the researcher made systematic comparisons between empirical observations and between categories during their analysis. (3) The research provides enough evidence for the reader to form an independent assessment that agrees with the researcher's claims
Understanding (Strauss and Corbin, 1990)	The extent to which participants accept results as representations of their worlds	(1) Participants were asked to review summaries of research findings and verify that they reflected their stories. Discrepancies were reconciled. (2) Colleagues and practitioners were asked to review a summary of findings to verify that they buy into the findings

(continued)

Table I.
Assessing GT

Heading	Definition	Evidence of compliance
Contribution to practice		
Workability (Glaser, 1978)	The theory provides an actionable framework with practical implications	Participants and practitioners were asked to review summaries of research findings and agreed that the findings provide insights into the phenomenon that are meaningful to practitioners
Usefulness (Charmaz, 2006)	The analysis offers solutions to problems that people can use in their work lives	The analysis offers useful interpretations that lead to better understanding or processes that can be applied to real world problems or situations
Control (Strauss and Corbin, 1990)	The extent to which organizations have influence over some aspects of the theory	The analysis offers variables within the theory over which participants in the phenomenon have some degree of control and can therefore influence outcomes within the phenomenon
Contribution to theory		
Relevance (Glaser, 1992); Originality (Charmaz, 2006)	The theory provides new or alternative explanations for behavior that go beyond that offered in the literature. Relevance measures the weight of the theory's contribution as a new or alternative explanation	Participants were invited to comment on how well the research addressed the core issues of the phenomenon. This can be accomplished by providing participants with a summary of the research results after the researcher writes up the initial draft of the results. The focus of this process is on identifying core issues that have relevance for research
Generality (Strauss and Corbin, 1990); Scope (Glaser, 1992)	The extent to which the research investigates, and the resulting findings clarify, a broad variety of situations within and across multiple aspects of the phenomenon	(1) Evidence is presented that the researchers used theoretical sampling to select participating organizations and individual participants. (2) Interviews and other data collection procedures were of sufficient detail and openness to provide a multi-faceted understanding of the phenomenon
Parsimony (Glaser, 1992)	To achieve parsimony, categories and their properties are limited to those that best help explain behavior	The theory utilizes the minimum number of categories and properties that explain the majority of the behavior. Member checking sessions were used to assess how well the core category succinctly explains activities within the phenomenon without bogging down the theory with details of marginal value. Adjustments were made based upon participant feedback

Table I.

time and considerable patience. As the sample size is based on reaching theoretical saturation the length of time required for data collection is unknown at the start of the research. It can often be difficult to determine whether theoretical saturation has been reached. The researcher may need to spend significant time sampling organizations and individuals before he or she is sure that no new theoretical concepts are emerging from the research.

Third, the researcher must be skilled in interviewing, participant observation and qualitative analysis. Such skills must be learned and practiced. While qualitative analysis tools are available to assist the researcher, they will not perform important functions such as the determination of the most appropriate open code for a meaning unit or selection of core categories. These tasks are left to the skill of the researcher. Lastly, GT can be somewhat intrusive. Organizations may be reluctant to allow employees to participate in confidential interviews, may not want their employees to take time away from their jobs, may be uncomfortable allowing a researcher access for the purposes of observing organizational activities, or may have to refuse participation due to objections from their legal department. This often makes finding suitable firms willing to assist very difficult.

Summary
GT provides a pattern searching method that enables researchers to understand the underlying environmental and organizational structures and conditions that firms act within and upon. GT provides research results that are understandable to practitioners because the findings are grounded in the practitioners' experience. These results are also timely as they provide salient issues of concern to practitioners. Lastly, GT offers results with theoretical significance in an area not previously researched or lacking strong theory.

This paper demonstrates how GT, an inductive method, can be an appropriate tool for creating theory in supply chain research. In doing so, we have provided an overview of the GT technique and given a basic understanding of why GT works and where it might be applied. With that foundation, we provide a step-by-step guide of how the GT technique should be employed using examples from our own research. This guide can serve as a basis for understanding GT techniques in supply chain research. Finally, a method for assessing GT research, along with a table for researchers and reviewers to judge the merit of particular research, has also been provided.

This paper distills the essential elements of "good" GT. We believe GT provides a holistic approach for furthering the development of SCM theory and hope that our work – creating a framework for GT research in SCM research – provides the tools that researchers need in seeking to discover and develop SCM theory.

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